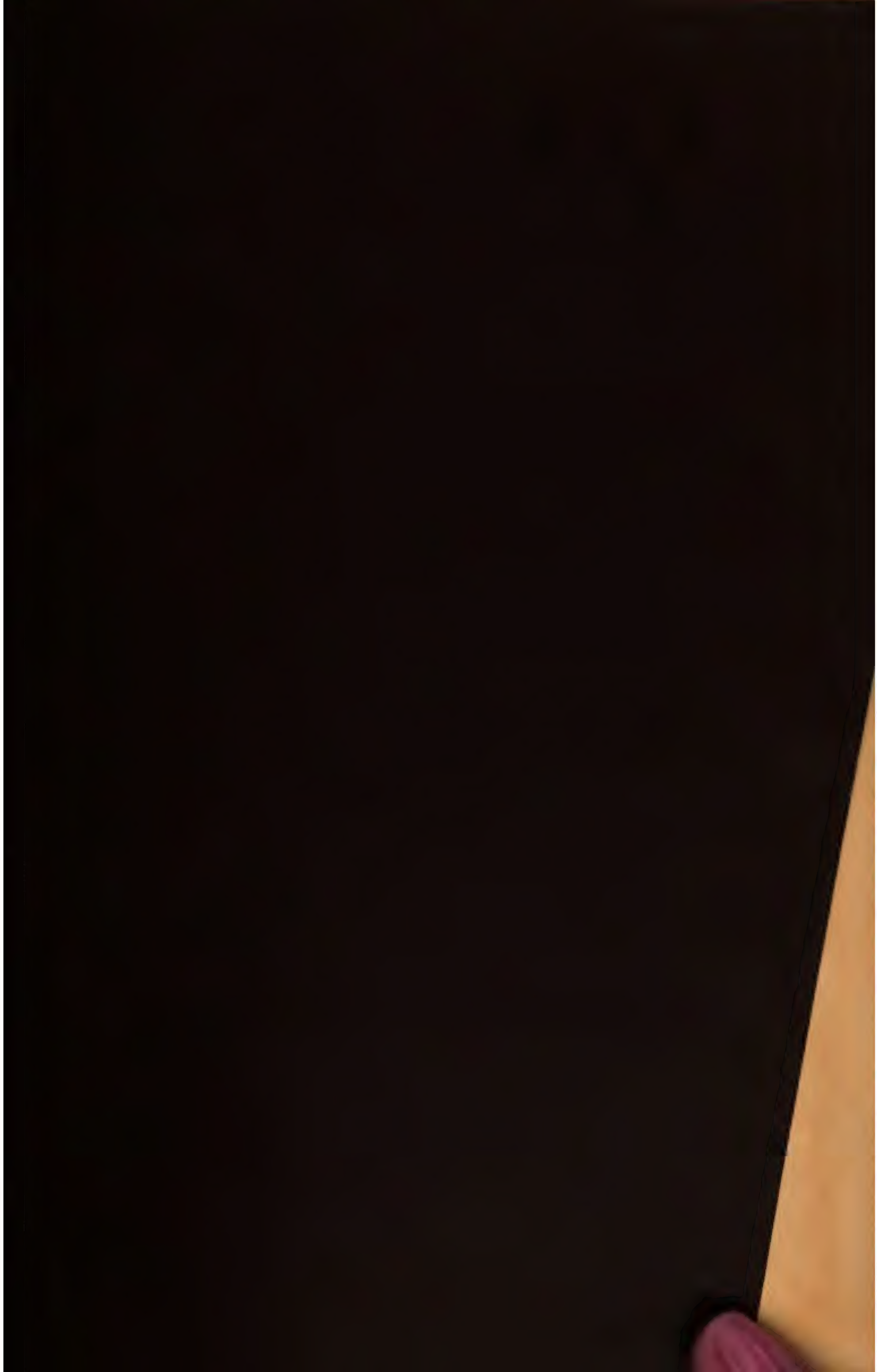
JOURNAL
OF THE
FEDERATION
OF
INSURANCE INSTITUTES
OF
GREAT BRITAIN AND IRELAND.



THE FEDERATION OF INSURANCE INSTITUTES
OF GREAT BRITAIN AND IRELAND.

JOURNAL

1903.

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Dr. — **FOR TWELVE MONTHS ENDING DECEMBER 31st, 1902.** — **Cr.**

Dr.			Cr.		
To Balance from last Account		£102 12 11	By Journals—		
,, Journal Sales—			Printing Volume IV.		£225 12 4
Institutes	£180 12 0		,, Examinations—		
C. & E. Layton	23 14 11		Printing and Stationery		27 8 9
Sundry Sales	10 10 10	214 17 9	,, General Expenses—		
,, Examinations—			Secretary's Salary	£35 0 0	
Entrance Fees		19 15 6	Allowance for Office Expenses	15 0 0	
,, Contributions—			Postages and Petty Cash	24 2 5	
From Insurance Companies	£96 19 0		Printing and Stationery	8 7 2	82 9 7
,, Institutes	40 17 3	137 16 3			
,, Bank Interest		1 19 9	,, Balance in Bank		141 11 6
		£477 2 2			£477 2 2

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Manchester, May 27th, 1903.

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THE FEDERATION OF INSURANCE INSTITUTES
OF GREAT BRITAIN AND IRELAND.

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Founded 1887.

Objects: (1st) The reading of papers and delivering of lectures by members, or experts who are not members, upon subjects connected with Insurance business generally. (2nd) The discussion of all questions relating to such business. (3rd) The promotion of social intercourse amongst members of the profession in Birmingham and district.

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Established 1901.

Objects: The cultivation of knowledge of Insurance business generally (excluding Actuarial, Mathematical, and other cognate subjects, these being already provided for by the Faculty of Actuaries); the formation of a Library of professional works for the use of Members and Associates; and the promotion of social intercourse among those connected with the Insurance profession.

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Founded 1881.

Objects: (1st) The promotion of the study of the principles of Fire and Life Assurance, and of Assurance against other contingencies. (2nd) The consideration of all subjects to which the doctrines of probabilities may be applied, as well as the best methods of collecting and applying statistics. (3rd) The consideration of questions bearing on social science or political economy. (4th) The formation of a Library of professional works for the use of Members.

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Founded 1885.

Objects: (1st) The promotion of the study of the principles of Fire and Life Assurance, and of Assurance against other contingencies. (2nd) The

consideration of all subjects to which the doctrine of probabilities may be applied, as well as the best methods of collecting and applying statistics. (3rd) An organisation for any purpose necessary for the requirements of the profession. (4th) The promotion of a good understanding amongst the members of the Insurance profession in Ireland.

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Founded 1883.

Objects: To encourage the delivery of essays and lectures upon subjects connected with Insurance, and discussion thereon; to organise visits of inspection to such risks as the Committee of Management may decide upon; and to promote social intercourse amongst those connected with Insurance Companies.

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Founded 1896.

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THE FEDERATION OF INSURANCE INSTITUTES

OF GREAT BRITAIN AND IRELAND.

THE Seventh Annual Conference was held at the County Hotel, Newcastle-on-Tyne, on Friday, 12th June, 1903, on the invitation of the Insurance Institute of Newcastle-on-Tyne. Mr. John G. Boss (Royal), the President of the Federation, occupied the chair, and there were present:—

Past Presidents—JAMES OSTLER (Northern) and DAVID L. LAIDLAW (North British and Mercantile).

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Examiners—SAMUEL BUTLER (London and Lancashire) and ROBERT McCONNELL (Royal).

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	A. W. SNEATH (*Hand-in-Hand*).
	J. F. ALLEN (*Atlas*).

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Ex-President—Bernard H. O'Reilly (Manager, *Patriotic*), Dublin.

Past Presidents—F. Dalton (*Norwich Union*), Birmingham; J. B. Tennant, F.I.A. (Secretary and Actuary, *Friends' Provident*), Bradford; S. G. Moxey (*Prudential*), Bristol.

Delegates—Bristol, Grahame H. Wills, President; Manchester Association, T. Brand Miller (*Guardian*); Norwich, C. A. Bathurst Bignold, D.L., J.P. (*Norwich Union Fire*), President; E. B. Corsbie (*Norwich Union Fire*), Hon. Secretary; Yorkshire, C. M. Tate (*Ocean*), Leeds.

Examiners—A. Blair (*London and Lancashire*), Glasgow; J. Headon Booocck (*Commercial Union*), Birmingham; Charles D. Butler (*Royal Exchange*), Birmingham; E. A. Coutts (*North British and Mercantile*), Nottingham; H. A. de Buriatte (*Law Accident*), London; W. J. Drane (*Norwich Union*), Norwich; James Gemmell (*Royal Exchange*), Glasgow; C. H. Green (*Sun Life*), London; N. B. Gunn, F.F.A., F.I.A. (*Scottish Amicable*), Glasgow; J. Mason Guttridge (*Alliance*), Bristol; Charles Hobbins (*Rock*), Manchester; Owen D. Jones (*London and Lancashire Fire*), Leeds; W. S. Kinnear (*Royal Exchange*), Dublin; John Large (*Norwich Union*), Norwich; Philip L. Newman, B.A., F.I.A. (*Yorkshire*), York; H. Pocklington, (*Commercial Union*), Leeds; C. R. Quinton (*Norwich Union*), Norwich; J. B. Roberts (*Sun*), Leeds; H. E. Southam (*Ocean*), London; James Wardle (*Liverpool and London and Globe*), Leeds.

After the adoption of the Minutes of last Conference, the Secretary read the Report of Executive Committee, 1903.

Secretary's Report, 1903.

During the past year the work of the Federation has gone steadily forward, and some new developments have engaged the attention of the Executive.

It is agreeable to record that the hopes expressed last year in reference to the Insurance Clerks' Orphanage have been fully realised, the Orphanage being now an established Institution with a large body of subscribers and patrons. Its formation has already been justified by events, one grant having been made.

The Journal, of which the fifth volume was issued early in January, maintains the high standard of its papers. In addition to the President's admirable address, it contains nineteen papers supplied by ten of the eleven federated Institutes, besides one from each of the affiliated Institutes of Montreal and Toronto. It is encouraging to know that practically every member of the federal union is contributing to the success of the Journal, and it is hoped that every Institute may recognise the privilege as well as the duty of giving of its best to the organ of the Federation. The contents include ten papers dealing with fire insurance subjects, six with life assurance, one with accident insurance, and two on general subjects.

The number of candidates for the Annual Examinations held last April shows a decided increase over that of any previous year, and includes five from Toronto.

Examinations have been held at all the Institute Centres, viz.:—Birmingham, Bristol, Dublin, Edinburgh, Glasgow, Leeds, Manchester, Newcastle, Norwich, and Nottingham, as well as in London, Aberdeen, Dundee, and Perth, where the Federation is not represented, and acknowledgment is due to the officials of the various Offices where the examinations were held for their kindness in placing rooms in their respective offices at the disposal of the Federation, and for their presence at the examinations as presiding officers.

It was with sincere regret that the Executive received the resignation of Mr. J. B. Roberts as one of the Honorary Secretaries to the Examiners. The magnificent pioneer work which Mr. Roberts accomplished with such devotion in the early and critical years of the examinations will ever call forth the lasting gratitude of those who have its interests at heart.

The Executive have had under careful consideration the general question of admitting the Colonial Institutes to participation in these examinations.

The Conference will be asked to admit a third Colonial Institute to the privileges of affiliation, that of South Africa. An application for affiliation from the Insurance Institute of New Zealand will also be brought up for consideration.

The Draft Constitution and Bye-Laws have been very carefully prepared, and, after approval by the Manchester and Yorkshire Institutes and the Executive, were forwarded to each Institute in the Federation. The constitution now submitted is the result of many conferences and much correspondence. It is hoped that this codification of rules laid down by Conference from time to time may be found of practical value in the working of the Conference and of the Federation.

The finances of the Federation are in a satisfactory condition, the revenue for the year amounting to £374 9s. 3d., and the expenditure to £335 10s. 8d. Two Offices have been added to the list of honorary subscribers.

The Executive desire to record their thanks to all who have in any way contributed to the success and prosperity of the Federation during the past year, to the contributing Offices for their valuable financial assistance, and to the Examiners, the Publications Committee, Treasurer, and the President for their respective services, each so essential to the well-being of the whole.

The PRESIDENT — Mr. John G. Boss — then addressed the Conference as follows:—Gentlemen,—It was with very great regret I was unable to be present at the Conference held in Dublin last year, and on that occasion to thank you for

conferring upon me the Presidentship for the ensuing year. I can assure you I very much appreciate the honour you thus bestowed upon me.

In welcoming you, on behalf of the Insurance Institute of Newcastle, to this ancient city, may I remind you that it is the smallest town which the Federation has yet favoured with a visit, and yet it is a city full of interest to the historical student. It takes its name as Newcastle from the fortress erected in 1080, in contradistinction to the old Roman structure of Pons Ælii which was on nearly the same site. As a walled town with numerous posterns it was on many occasions the scene of a struggle between the English and Scotch, and the Norman King's "New-castle" was in those days of Border rivalry by no means a mere antiquarian curiosity.

Following in the wake of other cities, Newcastle was not slow in trying its hand at Fire Insurance. The first Fire Office of which we have any record was the "Newcastle Fire Office," established in 1783, and which continued to transact a successful business until 1860; in fact, of the numerous provincial Fire Offices established in the eighteenth century only the "Salop" continued its existence longer than the Newcastle Fire Office. As to Marine Insurance, there were no doubt in existence clubs and private underwriters long before the creation of this Fire Office. In the neighbouring county of Durham, the Darlington Marine Insurance Company is still carrying on business; it was established in the year 1782, one year earlier than the Newcastle Fire Office. The first local Company established to transact Life business was not commenced until 1836.

I should also like to take this opportunity of welcoming the esteemed President and other delegates of the Insurance Society of Edinburgh, as this is the first Conference at which we have had the pleasure of their assistance. It is very gratifying to think that two other Colonial Institutes have applied for affiliation with the Federation—viz., the South African and New Zealand Institutes.

I can feelingly echo the remarks made by my respected predecessor at Dublin last year when he stated that the time

had not arrived, nor was it yet expected, that an elaborate address propounding some new theory in the practice of Fire or one of the numerous branches of Insurance business should be given by the President. This would inevitably lead to discussion, and as a result the usual procedure at our Conferences would have to be materially altered.

On glancing through the proceedings of previous Conferences, the worthy occupants of this chair have placed before you in forcible language the benefits anticipated from the formation of the Federation, and as this is the seventh Conference that has been held I venture to think that it will not be out of place to briefly review our previous proceedings. The leading principles laid down at the first Conference, held in Manchester in 1897, on the invitation of what I may term the Father of the Institutes, the Insurance Institute of Manchester, have been faithfully observed. After the formation of the Federation, the programme then sketched out, briefly was—

The Orphanage;
The production of papers;
The issue of an annual volume;
The educational work.

We have now the satisfaction of being able to record that the Insurance Clerks' Orphanage has been duly established and registered, and I am sure you will all join with me in congratulating Mr. A. D. Brookes on the accomplishment of his object. We are also indebted to Mr. Pipkin and other gentlemen for taking the matter up and extending to the movement their very valuable support and interest. At present there are upwards of 2000 members, with funds in hand amounting to £6000, and already its benefits have been extended to the widow and the orphan. Had the Federation accomplished no other object, we might well have been satisfied to have materially assisted in the creation and handing down of an established fund which will render substantial assistance to the widow and orphan in the form of an augmented return of the contribution made by the member in his lifetime.

I would impress upon all Insurance officials the desirability of at once becoming members of the Orphanage. The minimum subscription is the trifling sum of five shillings per annum, an amount which is within the reach of every official.

The Institute of Actuaries and the Faculty of Actuaries in Scotland deal with matters chiefly connected with Life business, and although educational their work is also largely statistical; the foundation of this is obtained chiefly from tables and information published by the various Governments, from the Life Offices, and other sources. We have no such data to work upon—no reliable returns in detail are published as to the amount paid as compensation from Fire or Accident. We are not statistical so far as the obtaining of such information is concerned, because this can only be obtained by a return of the various Companies, and that is a subject that does not come within our constitution. We rather deal as to Fire and Accidents with an intermediate and a more important stage, if you will allow me so to term it. From the earliest period of Fire underwriting there has always been differential rating, although in the past it has been of a very imperfect nature. At the present time more attention is being given to this subject, and correctly so—*i.e.*, for each class of risk or department of trade for the purpose of Insurance underwriting it is only equitable that the premiums received should be sufficient to meet the claims and expenses and to leave a reasonable profit. It is admittedly unfair that a particular trade which from an Insurance point of view is of a non-hazardous description should be saddled with a heavy premium through another class being the source of frequent claims. I think I may safely say that in arriving at the premium chargeable for Workmen's Compensation risk there are many points of affinity with Fire underwriters, and in the immediate future it will no doubt be considered as necessary to make the same close observations of a hazardous risk which are now done by the Fire Office.

I now come to the necessity of that intermediate course. What we are endeavouring to do, and so far I claim we are doing it very successfully, is to draw attention through papers

read at our Institutes to the special features of various hazards, so that, when these risks are dealt with by those whose duty it is to decide on the scale of rating, complete information is conveniently obtainable. By bringing before the manufacturer features of risk likely to cause fire, and by suggesting means of prevention, we are not only endeavouring to prevent a waste in the national wealth, but we suggest alterations or improvements which will enable Companies to charge a reduced premium, and thus to diminish the cost of production.

As to the five volumes that have already been issued, it is no exaggeration to state that they constitute the best reference, on the various subjects touched upon, it is possible in Fire Insurance practice to obtain, and chiefly so because they have been written by Insurance men for Insurance men. At no previous period during the practice of Fire Insurance has such information been at the disposal of the student, and I use this term in its widest sense, as with the ever-increasing deviation in processes and the new methods of manufacture, which entail new features of hazard, we are all students, however grey in years we have grown in the service. Further, in most subjects dealt with, not only is the particular process from an Insurance point of view detailed, but very full information is given of the various materials used in such manufacture, and of their origin.

The number of students who entered for this year's examination shows a considerable increase on the previous examinations; the results will be placed before you, and I feel sure they will be considered satisfactory and encouraging. It is most gratifying to think that the Toronto Institute requested that we should hold simultaneous examinations there. This proves how much the work of the Federation is appreciated in the Colonies.

I am sure you will all very much regret to notice in the report on the examinations that Mr. J. B. Roberts, who has been Honorary Secretary to the examining body from the commencement, has unfortunately felt it incumbent on him to resign. We are greatly indebted to Mr. Roberts for the

enormous work he has done for the Federation, and as the subject will be more fully dealt with in our proceedings to-day, I will only say we all hope that he will soon be restored to his usual health, and that he will be long spared to give us his advice on the subject he has so much at heart.

It is also very pleasing to observe the number of classes formed in the different centres for the study of the various subjects in the syllabus, where, even if the student should not present himself for the examination, he may acquire information which will be most valuable to him in his business. Before the formation of the Federation such a procedure in the profession as regards Fire Insurance was unknown. To the gentlemen who conducted these classes we are all indebted. The chief appointments in the Insurance world are open to all, and no monetary capital is required. The applicant must, however, have a full knowledge of the details and practice of his profession, and this should be combined with tact and judgment. We now offer to assist those who are desirous of obtaining such knowledge.

You will have submitted to you during the present Conference a draft constitution of the Federation. It has been considered desirable to reduce the various regulations to a convenient form. There is practically no deviation from the original idea, with the exception of the introduction of a new class of members, to be termed honorary members. I consider this is a step in the right direction, and it will enable to be associated with us many gentlemen who are in full sympathy with our work, and yet are not permitted to be so under the present regulations. There is one matter consequent upon our constitution, to which I would like to refer. If any important question is to be decided, although we receive an expression of opinion from many sources, yet when the crucial point of voting arrives the voting is by Institutes only—*i.e.*, one vote for each Institute. The number of votes to be recorded is necessarily restricted, and therefore in giving a vote on any important matter the delegate is expected to exercise his powers so that his vote shall be in accordance with the wishes of the majority of the members of the

Institute he represents. Whether this system is representative is open to question.

I think it would be an advantage if we commenced the formation of a Central Library in connection with the Federation. I am aware there are certain difficulties in carrying out such a scheme, but I feel to such a library many rare books would be presented which would not find their way to the library of any local Institute. In view of the strides we are making—the various Institutes have already a combined membership numbering 1700—the time is not far distant when it will be found necessary to have a Central Office, but in the meantime such a library could be left in charge of the Secretary.

In conclusion, I trust we shall never depart from our original scheme, and that we shall always remain practically an educational body; we have plenty of scope, and need not stop at the production of papers and the holding of examinations. At the same time we must maintain the prestige of our annual volume, and to this end I should be glad to see the Federation decide to offer a liberal monetary prize each year for the best essay on some subject bearing on Insurance and cognate subjects, to be called the "Federation Prize Essay," the competition for which should not be limited to members of Institutes forming the Federation, but should be open to all. Our examinations must be carried on with no uncertain hand, and we must make it clear to the profession that the certificate of the Federation is a guarantee of the holder's knowledge of the various subjects in the particular branch in which he has been examined, and is a most valuable asset. If we only keep to these lines we shall continue to receive the liberal support of both Companies and individuals.

SEVENTH ANNUAL CONFERENCE OF THE FEDERATION OF INSURANCE INSTITUTES,

NEWCASTLE-UPON-TYNE, 12th June, 1903.

THE INSURANCE CLERKS' ORPHANAGE.

SINCE the Conference held in Dublin in June, 1902, the Provisional Committee, which then reported to the Conference, has ceased to exist, having been merged into the General Committee, appointed at the London meeting, to take up the work commenced by the Provisional Committee. The Orphanage is now established on a legal basis and has met with a large measure of success. For full details the Conference are referred to the First Annual Report of the General Committee which has just within the last day or two been issued to the members of the Orphanage.

REPORT OF THE GENERAL COMMITTEE TO THE FIRST ANNUAL GENERAL MEETING OF MEMBERS, TO BE HELD AT HAMILTON HOUSE, VICTORIA EMBANKMENT, ON 24TH JUNE, 1903, AS APPROVED AND CONFIRMED AT THE GENERAL MEETING.

The General Committee have much pleasure in submitting their First Annual Report to the Members of the Orphanage, together with Accounts and Balance Sheet made up to the 31st March, 1903.

The idea of an Insurance Clerks' Orphanage originated with Mr. Albert D. Brookes, the local Secretary of the Alliance Assurance Company at Bristol, who, in 1896, delivered an address before the Insurance Institute in that city, upon "the advisability or otherwise of forming" such an institution. From this the proposal to form an Orphanage developed and met with hearty approval at successive Conferences of the Federation of Insurance Institutes

at Manchester, Birmingham, and Leeds; and at the Bristol Conference in 1900 a number of prominent Insurance officials were enrolled as a Provisional Committee to "proceed with the inauguration of the Orphanage."

The Committee did a vast amount of work in making the project known throughout the Insurance world, in keeping the idea alive, and sustaining interest in it by securing the co-operation of Managers and others. Finally, the Committee and their helpers, chiefly in the provinces, came to the conclusion that, in order to ensure success, they must enlist the practical sympathy of Head Offices. At the Glasgow Conference, therefore, in 1901, it was decided to appeal to London, where it was felt the institution must have its headquarters when formed.

Accordingly, a public advertisement was issued, inviting persons interested in the subject to attend a meeting at the Committee Room of the London Salvage Corps in Queen Street, Cheapside, on 30th October, 1901. There was a large attendance, including many of the Managers and chief officials of Companies, and after the report of the Provisional Committee was considered, a resolution was passed heartily approving the principle of an Orphanage on the lines recommended in that report, and pledging those present to assist in carrying out the enterprise.

A General Committee with full powers was thereupon appointed by the meeting. The first act of that Committee was to send out invitations to all Insurance Companies throughout the Kingdom to return the names of members of their staffs who would be likely to support the scheme, so that the Committee might be able to judge whether there was a probability of adequate membership. By March, 1902, returns had been received showing that 1,754 officials from forty-two Offices would join, representing subscriptions of £1,100. The Committee felt that this justified them in proceeding with the formation of the Orphanage.

Taking the Constitution which had been prepared and recommended by the Provisional Committee as a basis, and with the advice of the Solicitors, a Memorandum and Articles of Association were framed, fully considered and discussed, and finally approved in a form acceptable to the Board of Trade, whereby the liability of each Member of the Orphanage, in respect of its debts and obligations, is limited to 5s.

On 25th July, 1902, the institution was registered, the Board of Trade issuing their certificate that the Insurance Clerks'

Orphanage had been incorporated under the Companies Acts, 1862 to 1900.

Meantime, the Committee were greatly gratified at securing Lord Rothschild as their first President, and several well-known gentlemen of influence to act as Vice-Presidents. The General Committee was strengthened by valuable additions from the ranks of the Managers, and secured the services of Mr. R. C. Cole as Secretary, whose devotion and work in the interests of the Orphanage, the Committee most gratefully recognise.

The first Prospectus was issued in August, 1902, and sent to more than 1,000 Insurance Offices in the Kingdom, and Local Committees, consisting of officials of Insurance Companies, were appointed at the following centres:—Bristol, Dublin, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Newcastle, Norwich, and Nottingham, and one at Birmingham is in course of formation. Your General Committee are greatly indebted to the gentlemen on these Local Committees for the admirable and effective manner in which they have brought the Orphanage under the notice of the Companies' staffs, and arranged for the collection of Members' subscriptions.

Financial help from the first was volunteered by gentlemen outside the Insurance profession, and from retired officials of Companies, as well as from Managers and officers whose children are never likely to become claimants on the funds of the Orphanage. Handsome donations flowed in without solicitation, including 21 of £100 each, and, in addition, eight Companies have sent contributions as under, £526 5s. of which was received prior to 31st March:—

Atlas Assurance Company	£100
Commercial Union Assurance Company	£100
Northern Assurance Company	£100
Phœnix Assurance Company	£100
Sun Fire Office	£100
Union Assurance Society	£100
Westminster Fire Office	£100

AND

Essex & Suffolk Equitable Fire Insurance Company £26 5s.

The Articles of Association provide for the Accounts to be made up to the 31st March in each year, so that those presented herewith, dating from the registration of the Orphanage in July, 1902, are for a period of eight months only. The receipts

amounted to £5,486 2s. 10d., of which £4,421 3s. 6d. is carried to Capital Account in accordance with the Articles; the interest only on this capital being carried to Revenue Account.

The total working expenditure, which included Establishment Expenses, Board of Trade and Counsel's Fees, amounted to £221 17s. 3d.

Applications for membership, either Annual or Life, have been received from members of staffs of sixty different Insurance Offices, and at the present time the total number of Members on the Register is 2,007, of whom 1,740 are Annual Members.

The usefulness of the Orphanage has already been shown. The first claim arose in March last from the widow of a Member with two children. The elder, a boy of six, was admitted to the benefits of the Orphanage, and an annual grant of £32 is being made to the widow on his account.

While the Committee think the present membership and financial position of the Orphanage are gratifying and show conclusively that there is a general recognition that it will supply a want, they do not consider that the number of Members now enrolled, or the amount of annual subscriptions secured, are sufficient with the donations received to place the institution on a self-supporting basis. They would, therefore, urge upon Members, in their own interests, to do their utmost in bringing the advantages offered by the Orphanage to the attention of every Insurance employee who has not yet become a Member. The experience of a similar institution shows that an annual income equal to 15s. per Member is necessary. On this basis, with the present Membership, an additional £600 per year is desirable. The Committee therefore appeal for increased annual subscriptions, and will be glad to receive further donations from the Companies.

The Committee offer their thanks to all who have assisted in completing the work so persistently and enthusiastically carried on for years by the gentlemen forming the Provisional Committee in the provinces, and their congratulations to those gentlemen and to Mr. Brookes (to whom must ever belong the honour of having founded the institution) in seeing the work of their hands crowned with a present success that promises to lift from the Insurance profession the reproach of neglecting the orphans of its members who were called away all too soon to make provision for those they left behind.

Nor should acknowledgment be omitted to the Committee of the London Salvage Corps for permission to have the Registered Office of the Orphanage at their premises in Queen Street, and for the use of their room for the meetings of the Committee, and for permitting their Secretary to act as Secretary of the Orphanage.

A debt of gratitude is also due to the Insurance Press for gratuitous advertisements and publication of much information respecting the progress of the Orphanage, thus contributing to the success attained.

SAML. J. PIPKIN, *Chairman.*

9th June, 1903.

THE INSURANCE CLERKS' ORPHANAGE.

ACCOUNTS TO 31st MARCH, 1903.

INCOME.

To Life Subscriptions from 245 Members	£3,412 3 6	
,, Donations of £20 and upwards ...	482 15 0	
,, Donations from Companies	526 5 0	
		£4,421 3 6
,, Annual Subscriptions from 1,611 Members	£629 13 0	
,, Donations under £20 each	410 18 0	
,, Interest	24 8 4	
		1,064 19 4
		£5,486 2 10

EXPENDITURE.

By Transfer to General Capital Account in accordance with the Articles of Association of the Orphanage		£4,421 3 6
,, Working Expenses—		
Legal and Establishment Expenses	£97 6 2	
Stationery, Printing, Postages, and Petties	124 11 1	
		221 17 3
,, Grant (One Quarter)		8 0 0
,, Balance carried to Balance Sheet		835 2 1
		£5,486 2 10

BALANCE SHEET, 31st MARCH, 1903.

	£	s.	d.					£	s.	d.
To General Capital Account, being all Life Subscriptions (£3 3s. and upwards) and Donations of £20 and upwards	£4,421	3	6	By Investments at cost :—						
,, Balance of Income and Expenditure Account ...	835	2	1	£3,759 18s. 3d. Consols 2¾ per cent.				£3,498	17	9
NOTE.—Under the Memorandum of Association the liability of each Member is limited to 5s. in the event of the institution being wound up.				£1,016 16s. 0d. Birmingham Corporation 3 per Cent. Stock				1,001	2	3
				,, Cash at Bank	£744	19	11			
				,, ,, in hand	11	5	8			
								756	5	7
	£5,256	5	7					£5,256	5	7

AUDITORS' CERTIFICATE AND REPORT.

In accordance with the provisions of the Companies' Act, 1900, we certify that all our requirements as Auditors have been complied with.

We have examined the above account of Receipts and Payments for the eight months ended 31st March, 1903, and the Balance Sheet as at that date with the books and vouchers of the institution, and report to the Members that in our opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the institution's affairs, as shown by such books and accounts.

We have ascertained that the Investments standing on the Balance Sheet were at the date thereof duly registered in the joint names of three members of the General Committee.

PRICE, WATERHOUSE & CO., *Auditors.*

10th June, 1903.

THE FEDERATION OF INSURANCE INSTITUTES

OF GREAT BRITAIN AND IRELAND.

Founded 12th March, 1897. Constitution agreed to, 12th June, 1903.

CONSTITUTION.

1. The organisation shall be called "THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND." Title.

2. The objects of the Federation are to encourage the study of all subjects bearing on every branch of Insurance, to promote the technical education of junior Insurance officials, and to do all such things as may be deemed desirable to advance the welfare and efficiency of the Insurance profession. Objects.

3. The Federation shall consist of Institutes, Associations, or Societies in Great Britain and Ireland established for the above-named purposes. Membership.

4. The Institutes now forming the membership of the Federation are the following, viz.:—

The Insurance Institute, Manchester.
The Insurance and Actuarial Society of Glasgow.
The Insurance Association of Manchester.
The Insurance Institute of Ireland.
The Norwich Insurance Institute.
The Birmingham Insurance Institute
The Insurance Institute of Yorkshire.
The Insurance Institute of Bristol.
The Insurance Institute of Newcastle-upon-Tyne.
The Nottingham Insurance Institute.
The Insurance Society of Edinburgh.

5. Insurance Institutes established abroad or in any of the Colonies or Dominions of the British Empire may be affiliated

with the Federation on such terms and conditions as may be provided by the Constitution and Bye-laws, but shall have no control in the management.

6. The Institutes now affiliated with the Federation are:—

The Insurance Institute of Toronto.

The Insurance Institute of New Zealand.

The Insurance Institute of Montreal.

The Insurance Institute of South Africa.

7. The admission of new Institutes to the Federation, or of Institutes applying for affiliation, shall be by the unanimous vote of the Conference.

8. Subscribers of not less than One Guinea per annum to the Funds of the Federation shall be eligible as Honorary Members. They shall be entitled to two copies of the "Journal" for each guinea subscribed, and a list of all Honorary Members shall be published in the "Journal" each year.

Operations. 9. The operations of the Federation shall be regulated by an Annual Conference and an Executive Committee elected thereat, with such Special and Sub-committees (the Honorary Secretaries of which shall be appointed by the Conference) as may from time to time be determined upon, and may include

(*a*) The publication of a "Journal,"

(*b*) The holding of Examinations,

(*c*) The offering of Prizes for essays or research in any subject bearing on Insurance business,

(*d*) The formation of a Library of Insurance works,

(*e*) The encouragement and support of the Insurance Clerks' Orphanage and/or other charitable institution which may commend itself to the Conference, or

(*f*) Any other matter which in the opinion of the Conference may be considered desirable for the general welfare of the Federation or the Insurance profession.

Office-bearers. 10. The Office-bearers shall consist of a President, an Honorary Treasurer, and a Secretary, and of the Honorary Secretaries to all Special or Sub-committees, and shall be elected annually by the Conference, which shall also fix the remuneration of the Secretary. It shall be competent to the Conference to delegate to any Special or Sub-committee the election of one of its number as Honorary Secretary to such Special or Sub-committee.

Executive Committee. 11. The Executive Committee shall consist of two Delegates from each Institute, Association, or Society embraced in the Federation

in full membership, together with the Honorary Secretaries to all Special and Sub-committees and any others who may be appointed from time to time by the Annual Conference.

12. Any vacancy occurring in the Office-bearers or Executive shall be filled up by the Executive Committee at a meeting specially summoned for that purpose, and the appointments so made may continue in force until the next Conference. Vacancies.

13. The Examiners shall be elected annually by the Conference. Examiners

14. The Annual Conference shall consist of the Office-bearers, the President of each Institute, all Past Presidents, the Examiners for the time being of the Federation, the Honorary Secretaries of Special and Sub-committees, the Honorary Secretary of the Institute at which the Conference is held, and two Delegates from each Institute. Annual Conference.

15. At all Meetings of the Conference and the Executive Committee the Chair will be taken by the President, or, in his absence, by one of the Past Presidents, whom failing the Chairman shall be elected from among those present.

16. All voting at the Annual Conference and at meetings of the Executive Committee shall be by Institutes, one vote only being allowed to each Institute, the President having a casting but not a deliberative vote. Voting.

17. The Conference shall not exercise any authority or control over any Institute, Association, or Society embraced in the Federation except in matters directly relating to the interests of the Federation, and if any question arise in connection with this Article it shall be decided by a vote of the Conference, two-thirds majority to decide the question, which must appear in the Agenda. Authority of Conference.

18. It shall be in the province of the Federation in Conference assembled to censure any Institute, Association, or Society, or terminate its membership, should it fail to effectively maintain the objects above set forth, or introduce any practice deemed to be inconsistent therewith, or otherwise infringe any part of this Constitution, or the membership of which may be deemed to be no longer advantageous to the Federation.

19. The duties of the Secretary shall be to keep the Minutes of the Executive Committee and of the Conference, to prepare the Agenda for the same, to send out Notices of all meetings, to assist all Sub-committees when required in any of their duties, to conduct the correspondence of the Federation, and generally to do all such things as usually pertain to the duties of his office. Duties of Secretary.

Honorary Treasurer. 20. The Honorary Treasurer shall receive and give receipts for all moneys due to the Federation, and shall pay all just debts and demands owing by the Federation, and shall render an account of the same each year to the Annual Conference, such account to be made up to the 31st December in each year, and to be printed and sent by the Secretary to the Delegates a clear week before the Annual Conference.

Funds. 21. The funds of the Federation shall be derived from

(*a*) A levy laid on each of the Institutes, Associations, or Societies embraced in the Federation, the amount of such levy to be decided each year by vote of the Conference,

(*b*) The profits accruing from the sale of the "Journal," the price of which shall be fixed each year for Members and Non-Members by the Conference,

(*c*) Subscriptions received from affiliated Institutes, from Insurance Offices, and from Honorary Members.

22. The funds of the Federation may be used for any of the following purposes:—

(*a*) Printing of the "Journal" and of all reports, circulars, certificates, or other documents authorised by the Conference or Executive.

(*b*) Salaries of the Secretary or other officials authorised by the Conference.

(*c*) Any other object which may from time to time be ordered by the Conference as conducive to the well-being of the Federation in promoting its operations, as defined in Rule 9.

Meetings. 23. The Conference shall meet each year in the month of May or June in such convenient centre as may be decided by the Conference from year to year.

24. The Executive Committee shall meet at such times as may be required by the necessities of business to be transacted, and the place of meeting shall be left to the decision of the President for the time being of the Federation.

25. Fourteen clear days' notice shall be given of all meetings of the Annual Conference and of the Executive, and the Notice calling the meeting shall state the principal business which is to be brought forward; but after the business stated in the Notice convening the meeting has been finished, it will be competent for any Delegate to introduce any other business for discussion only with the consent of a majority of votes.

26. The Executive Committee shall be called at any time by the Secretary on a requisition from three or more Institutes, and such requisition must state the object for which the meeting is requested. At such Special Meetings of the Executive, the only business which may be transacted will be that stated on the Notice as the special business for which the meeting has been called.

27. The meetings of all Special and Sub-committees shall be called by the Honorary Secretary of each at such times and places as may be most convenient.

28. It will be the duty of the Executive Committee to exercise during the year such control over the work of the Federation and of all Sub-committees as may be desirable, to assist and direct when necessary such work, to deal with all matters on which an immediate decision may be required in the interest of the Federation, and to report to Conference. Duties of Executive.

29. Reports of all Special and Sub-committees to be submitted to the Conference shall be printed and in the hands of Honorary Secretaries of each Institute embraced in the Federation and Delegates one clear week before the date of meeting of the Conference. Reports for Conference.

30. The Publications Sub-committee shall submit to the Conference each year a printed report of its operations, with a list of proposed papers for the forthcoming volume of the "Journal," and any other suggestions connected therewith.

31. Subject to the provisions of the Constitution and Bye-laws, and for the purpose of promoting the objects of the Federation, the Conference shall cause Examinations to be held at such places as it may think fit, and shall prepare and publish Rules to regulate such Examinations, and to define the cases and circumstances under which the said Examinations shall severally apply, the subjects which they shall respectively comprise, the fees, if any, which shall be paid or deposited by candidates in respect of such Examinations, and the nature of the certificates, if any, to be granted to successful candidates. It may vary or rescind from time to time any of the said Rules of Examination, or add thereto, in any such manner as it may think fit, and may delegate to any Committees or Sub-committees such powers and instructions as may be necessary to carry out these objects.

32. The Honorary Secretaries to the Examiners shall submit to the Conference each year a printed report of the results of the

examinations, with recommendations for the examinations in the following year, and any other suggestions connected therewith.

Audit. 33. The Treasurer's statement of accounts shall be audited each year by two honorary auditors to be elected by the Conference annually.

Bye-laws. 34. The Conference shall make and alter such Bye-laws (not inconsistent with the Constitution) as may from time to time be found necessary, but two months' notice of any Bye-law to be proposed by any Institute, or of any alteration in an existing Bye-law, must be given to the Secretary, who shall forthwith intimate the same to the Honorary Secretary of each Institute embraced in the Federation.

35. All Bye-laws and alterations thereof must be sanctioned and approved by a vote of the Institutes represented at the Conference, a majority of two-thirds being necessary.

Alteration of Constitution. 36. No alteration or addition shall be made to the Constitution except at the Annual Conference, and two calendar months' notice must be given to the Secretary in writing of any such proposed alteration or addition, and it will be the duty of the Secretary to send copies of such proposed alteration or addition forthwith to the Honorary Secretary of each Institute embraced in the Federation.

37. No alteration or addition to the Constitution shall be made unless sanctioned by a majority of two-thirds on a vote of Conference.

BYE-LAWS.

1. Institutes affiliated with the Federation shall be charged an annual subscription to be determined by Conference, and shall be entitled to one copy of the "Journal" each year per member at the same price as is charged to the members of Institutes constituting the Federation plus the cost of carriage.

2. Should a vacancy occur in any Special or Sub-committee of the Federation, or Examiners, it will be competent for such Special or Sub-committee to fill up the vacancy till the date of the next Conference.

3. The President and Secretary of the Federation for the time being shall be *ex-officio* members of all Committees and Special or Sub-committees of the Federation.

4. Should the Delegate duly appointed to attend a meeting of the Executive Committee or Conference be unable to attend, the Council of the Institute may send, as a substitute, any member of the Institute.

5. At meetings of the Executive Committee, six shall form a quorum provided that they represent not less than four Institutes. The quorum for all Special or Sub-committees shall be decided by each.

6. Candidates for the Examinations in the Fire Department must be in the employ of an Insurance Company (otherwise than a Fire Insurance Company which is not a member of the Fire Offices Committee).

7. The names of all Offices subscribing to the Federation shall be published in the "Journal" annually, also the results of the Examinations and the Examination papers.

8. Each Institute is entitled to have one copy of the "Journal" for each of its members at the reduced price as fixed by the Conference annually, it being a condition of obtaining such copies at the reduced price that no member of any Institute shall be charged more than the reduced price, as fixed by the Conference, for his copy, and that no additional copies, whether applied for by members of Institutes or others, may be supplied at less than the published price.

9. The higher officers of Insurance Companies and representatives from any affiliated Institute or any other person of distinction may be invited to the Conference by the President for the time being with the consent of the Executive.

*** *For all statements made, and opinions expressed, in the papers of this volume, the respective writers are alone responsible.*

THE NECESSITY FOR A TARIFF ORGANISATION IN CONNECTION WITH FIRE INSURANCE BUSINESS.

THERE are many people who are honestly of opinion that absolutely unrestricted competition in everything, or at least outside the scope of their individual trade or profession, is the only satisfactory basis for carrying on business. Such persons, if they are not Insurance men, naturally take the view that any combination of Companies for the purpose of fixing rates of premium for fire insurance is opposed to the interests of the public. It sometimes happens that a policyholder becomes cognisant of the existence of such a combination in the following way:—He has been paying a low rate of premium for many years, and has perhaps made no claim upon the Insurance Company during that time, when suddenly he receives intimation that, in consequence of an adverse experience in the class of risk, his premium will be increased from the date of next renewal. Of course (human nature being what it is) he is annoyed, and resolves to remove his insurance to another Company. On proceeding to carry out this intention, however, he becomes aware that all the other good Companies propose to charge the same increased rate, and thereupon his annoyance is converted into righteous indignation. Needless to say, he at once becomes a pronounced "free trader."

It is not only individuals who object to Tariff organisations for fixing the price of fire insurance. In America certain States have gone so far as to enact laws declaring all such combinations to be offences against the State, and subjecting offenders to penalties and withdrawal of licence to conduct business. This action has probably been due to a mistaken notion on the part of the legislators, who have associated Fire Insurance Rating Associations with the great "trusts" and "combines" which, in some instances, after crushing all opponents and obtaining control of the home market, have enriched themselves by charging exhorbitant prices under the shelter of "protective" duties.

Possibly many of the purely Life Assurance men among our members may be disposed to doubt the necessity for arrangements limiting competition in rates of premium for fire insurance, seeing that there is no uniform tariff of premiums in connection with Life business. But, as I shall show later on, there are important distinctions between Fire and Life business which entirely vitiate any conclusion that might be drawn from the fact that Life Offices are able to get along without a Tariff Association for fixing rates of premium.

Some of our Fire Insurance members, while having no doubt in their minds as to Tariff Associations being good things for the Insurance Companies, are probably unaware, or only partially aware, of the great benefits which such Associations confer upon the public, and of the impossibility of securing without some combination of the kind that Fire Insurance Companies shall be solvent, solid, and permanent institutions, capable of providing the indemnity sought from them.

If, in what I have said, I have not misrepresented the attitude towards Fire Insurance Tariff Associations of some members of the public, and even of some members of this Society, and if I am able to-night to put before you considerations which lead irresistibly to the conclusion that Tariff Associations for regulating Fire Insurance business are necessary and beneficial to the public, I think I may perhaps be able to claim that I have not altogether uselessly occupied your time.

It may be well that at the outset we should glance at the duties of the Fire Insurance expert. In this way our minds will be prepared to appreciate the position in which fire experts and their Companies and the public would be placed if there were no tariffs. The fire underwriter, surveyor, or local representative—by whatever name he may be called—must have a complete knowledge of fire insurance rates for risks in his district, and of the principles on which these rates are based; and he must be able to survey risks and to deal with the moral as well as the physical hazard. The latter is the hazard inherent in the building reported on, arising from its size, the character of its construction, mode of lighting and heating, exposure to danger of fire spreading from some adjoining property, or to risk of a general conflagration, coupled with the hazard arising from the description of trade carried on in the building, or the nature of the goods or other contents of the building. The moral hazard is that arising from

the character of the occupiers of the building, which, if bad, or even only careless, may in certain circumstances render a physically good risk very undesirable. All, or nearly all, fires which are not due to incendiarism are due to carelessness in some form or other; and a risk of a very hazardous class, judged by the character of the building or nature of the trade carried on, may be eligible for insurance if in charge of persons of high character and scrupulous carefulness.

In connection with physical hazard, the fire expert ought to understand the principles of construction of buildings, and the various methods of lighting and heating. He ought to have some knowledge of chemistry, and of the various trades and manufactures in his district, and it is important that he should be well informed regarding the efficiency of the local Fire Brigades and the state of the water supply in the important centres.

Lest it should be thought that in this enumeration I have exaggerated the qualifications which are necessary or desirable in the case of the fire expert, I shall read to you a brief passage bearing on the subject from an admirable book published this year in New York, entitled "Fire Insurance and How to Build." The author is Mr. Francis C. Moore, formerly President of the Continental Insurance Company of New York, one of the most eminent of American fire underwriters, and well known as the deviser of the Universal Mercantile Schedule, that most brilliant of all attempts at scientific Fire Insurance rating. This is what Mr. Moore says:—

> "Vast and important responsibilities rest upon the officers and agents of Insurance Companies to so strengthen the Companies they represent, not only by avoiding unprofitable risks and inadequate rates, but by energetic and judicious accumulation of such a number of distributed risks as will enable them to meet exceptional disasters and extraordinary losses. That he may properly discriminate between safe and unsafe risks, and decide as to adequate rates of premium, it must be evident that the information of an underwriter must be varied and extensive. He should know, if possible, something of every other business whose hazard he undertakes to insure. There is probably no calling requiring so intimate a knowledge of every other as this. He who assumes the risk of a flour mill, for example, should know more of its dangers than the miller himself. Indeed, it is doubtful if an underwriter can be too well informed on any subject, or that he would be too well qualified for his profession if he could serve a life-time at

every other. Drawing a greater number of contracts in a year than do many lawyers in a lifetime, and standing often face to face with the most perplexing questions of jurisprudence, it may be questioned if he should know less of law than the attorney who has made it his profession. Seriously affected by every discovery of the chemist, and liable at any moment to have his chances of loss on whole classes of risk alarmingly increased by new chemical combinations which follow each other as rapidly as the changes of a kaleidoscope, he should know not less of them all than does the chemist himself. In short, there is scarcely a science, art, or manufacture with which he should not be more or less familiar; and if the successful conduct of any one business or calling requires a lifetime of study and application, how much more should the business of Insurance (which demands a knowledge more or less intimate of every other) require life-long study and the closest and most constant observation!"

But you will say that in this complex age no Admirable Crichton can be found approaching within measurable distance of the standard of universal knowledge thus set up, which is far beyond the powers of any single individual. That is true; but here it is that one of the advantages of combination comes in. The Fire Insurance Companies of this country collectively have in their service a large army of skilled surveyors, and each individual surveyor possesses more or less intimate knowledge of several of the matters enumerated above, while some have a very wide and varied knowledge embracing many of these matters. A vast amount of information covering the whole range of subjects is thus available for the benefit of the associated Fire Offices.

But you may ask—How do the Non-Tariff Offices get on, seeing that they have no such organisation or inter-communication? They work for the most part in splendid isolation; and it might be thought, after what has been said, that if they manage to get on at all their surveyors must be superhuman. The answer is to be found in a paper by the late Mr. James Robb, who was for a long time a branch manager in Manchester, the headquarters of non-tariff business, and who knew the facts probably better than any other man in the business. He said:—

"To deal with a risk on its merits is what our non-tariff friends profess to do, but only profess, for in regard to tariff risks, so long as there are Tariff Offices, Non-Tariff Offices must be guided by the tariff just as much as the others. They have learned to cut *under* but have yet to obtain the ability

to rise *above* tariff rates; and to be able to rate according to merits they must be able to do both."

We now come to the important question—What would be the effect of unrestrained competition in Fire Insurance business? To this the answer which would be given by any expert who has studied the question thoroughly, is—disaster and ruin to the Offices and heavy loss to the public. The late Mr M'Candlish, in his admirable paper on Fire Insurance which appears in the third volume of the Journal of the Federation of Insurance Institutes, says on this subject:—

> "It might be supposed that in conformity with the experience of other departments of business, competition might be left to fix the price at which the needed protection was to be obtained, but this is a business which has some very exceptional features. When goods manufactured or imported are sold the seller knows what they have cost him before he has to fix his price, and while there may be room for competition in limiting the cost of production or the ratio of expected profit, no man need carry on a business unless it is pretty certain to yield him a profit. But in Fire Insurance the price has to be fixed in the first place, and the cost comes afterwards; and unrestrained competition might mean that the price would be fixed by the most sanguine, the most ignorant and most speculative of the competitors, and would certainly land them all in a loss. This would probably be quite as injurious to the owners of property as to the Offices, for it is of the utmost importance to the public that they should have a reasonable number of wealthy, prosperous, and therefore safe Offices with which to insure their property. And if different classes of property are to be insured at fair rates corresponding to the risk, this could scarcely be attained if each Office were to be guided only by its own limited experience. Accordingly it has been found in most countries that these objects can only be secured by the Offices combining their experience and agreeing upon a scale of rates founded on this."

Mr. Moore, the eminent American underwriter, from whose book I have already quoted, says:—

> "Competition, which is claimed by some to be the life of trade, is the death of [Fire] Insurance if it results in inadequate prices or rates. The proper conduct of the business in the interests of all concerned involves accurately ascertained and equitable rates. A cheap price for insurance generally

implies reduced security or the absence of that which it is intended to purchase, and inadequate rates must sooner or later result in worthless policies."

But, as mentioned at the outset, Life Assurance Companies manage to get on without an agreement tying them down to uniform rates of premium; and they make their contracts for a lifetime, which is a much more serious matter if the rate is inadequate than a contract for a single year, the term for which the rate is binding in the case of the great majority of home Fire Insurances. I think it probable that if Life Assurances had all been on the non-participating plan there would have been a Tariff long ago. Life Assurances, however, are as a rule effected on the plan of participation in profits, and the rates of premium in the majority of cases are thus much above what would be required to provide for the bare sum assured. Then, the systems of bonus vary materially, and the successful bonus results in the case of some Companies charging high premiums have taught the public that there are other things than mere rates of premium to be taken into account in selecting a Life Assurance Company. Also, the Life Companies have trustworthy mortality tables to guide them, and the tendency of the more modern tables is to bring out slightly lower rates of premium than those brought out at the same rate of interest by earlier tables of mortality. Hence, although the interest earned on investments is now lower than it was thirty or forty years ago, the improvement in the chances of life has to some extent counteracted the effect of the reduction in the rate of interest, and thus the old rates of premium are still in most cases found to be adequate when tested by the most modern tables of mortality at a reduced rate of interest. In Life business the public are protected against new speculative or fraudulent Companies by the statutory requirement of a preliminary deposit of £20,000; and they are further protected against the risk of the existing Companies becoming insolvent by the requirement that all Life Companies shall lodge with the Board of Trade for publication their annual accounts and their valuation statements, with such particulars of their business—classified according to the ages of the lives—as would enable an outside actuary to make an independent valuation of the bulk of their business. There are no similar statutory requirements in the case of Fire business.

When a fire insurance is accepted there is always the hope that there will never be a claim under that insurance. The sanguine underwriter or surveyor or branch manager may therefore feel, even in a case in which the features are not altogether favourable, that he is not seriously committing his Company by passing the insurance and thereby pleasing the agent. The commitment is only for a year, and at the end of that comparatively brief period there will be an opportunity for revising the rate or for getting off the risk. This view of the matter often leads to a Company getting a number of undesirable risks on its books; and in the case of moderately hazardous business of a kind which is not regulated by any tariff (except the minimum tariff rate of 1s. 6d., which would, of course, be considered too low) there are numerous instances of rates of, say, 5s. to 7s. 6d. which are passed, but which are really quite inadequate. The experience of Companies in this class of business—which, happily, represents not more than 20 per cent. of the whole volume of home premiums—is so unsatisfactory as to afford an alarming view of what would happen if the same unrestrained competition were extended to the whole of the business.

It might be thought possible that a single Company, if large and old, might have sufficient experience accumulated in its own records to enable it to fix rates for all the main classes of risk. This, however, is not the case with manufacturing and mercantile risks, or even with shop risks, because of the rapid changes which are going on in processes and nature of goods and construction of buildings, and, to some extent, in rates of premium; and, from other causes, the recent experience of a single Company may sometimes be untrustworthy as a basis for rates of premium. Besides, supposing the experience of one Company to be large enough, and recent enough, and well enough spread, to afford a basis for premiums, it would be impossible in practice for the Company to act on its individual experience unless it brought out rates as low as, or lower than the current rates. Supposing that its experience brought out higher rates than those present, then, if it attempted to charge these higher rates or to decline business offered at the current rates, it would run serious risk of losing its agency connection.

Various instances have occurred, both in this country and in America, in which some Company with the largest individual interest in one particular district or in one particular class of risk

has taken out its experience for a period of years, and, finding it to be disastrous, has consulted with other Companies, or has brought the matter before the Tariff Association with a view to securing an increase in the rate. But on statistics having been obtained from the other Companies, it has been found that taken collectively the business of the Companies in the district or class of risk has yielded a fair profit. This has not occurred very often, but it has happened in a sufficient number of instances to demonstrate the untrustworthiness of the experience of a single Company as a guide in fixing rates of premium.

One of the chief objects of all Tariff Associations is to secure adequate rates of premium, which shall not only keep the Companies solvent but shall also yield such a reasonable rate of profit to the shareholders as to induce them to keep their capital in the business. But another equally important object is, or ought to be part of the scheme of such organisations, namely, to secure equitable graduation of the rates of premium in particular cases so as to avoid injustice to individuals and consequent dissatisfaction, which, if allowed to become acute, would be apt to bring about the formation of strong Non-Tariff Companies, and to entail the breaking-up of the Tariff, with all the evils and losses inseparable from a rate war.

I have before alluded to the Universal Mercantile Schedule which is adopted in some parts of the United States; and as this is the best example of the application of a complete scientific system to the fixing of rates of premium for Fire Insurance, I shall try to give a very brief indication of its principles and methods as gathered from the elaborate detailed descriptions given by its author, Mr. Moore.

The aim of the Schedule is to bring out, on a uniform and intelligible system, a rate for each class of insurance based on the actual fire cost as ascertained from the previous record for a period of five years, with an addition for all proper expenses, and for accumulation towards periodical and inevitable sweeping fires, and with a further addition to yield a profit of 5 per cent. to the shareholders.

The first step in the method is to fix a key rate for each city, proceeding from the basis of a standard unobjectionable building in a standard unobjectionable city.

> A *standard city* is one having gravitation waterworks with pressure sufficient at all hours to throw a good stream of

water over five-storey buildings, and with the main supply pipe in duplicate, or with an intermediate storage reservoir. Water-pipes and mains must be not less than six inches in diameter in the dwelling section, and not less than eight to ten or twelve inches in the mercantile section. There must be a paid Fire Department with twelve men to each steam fire-engine, and not fewer than two steam fire-engines to each square mile of the compact portion of the city, or one steam fire-engine to each 10,000 of population up to 500,000. There must be one hook and ladder truck to every four steamers; a fire alarm telegraph; efficient police; paved, macadamised, or other hard streets; and 60 per cent of the streets must be of 70 or more feet in width; a good building law, well enforced; no outlying exposures such as lumber districts to cause sweeping fires; no unjust municipal or state taxation of Insurance Companies; and a previous record of five years of annual fire claims not exceeding \$5 on each \$1,000 of insurance.

A *standard building* is one having walls of brick or stone (preferably brick) not less than 12 inches thick at top storey (or 16 inches if of stone), extending through and 36 inches above the roof, the walls to have parapet and coping, and to increase four inches in thickness for each lower storey down to the ground, the increased thickness of wall at each storey to be utilised for beam ledges. Ground floor area must not exceed 2500 square feet. Height must not exceed four storeys or 50 feet. Floors must be of 2 to 3 inches plank, covered by $\frac{7}{8}$th or 1-inch flooring crossing diagonally, with waterproof paper or approved fire-resisting material between. Wooden beams, girders, and wooden storey posts or pillars must be 12 inches thick, or if iron columns be used they must be protected. Elevators and stairways must be cut off by brick walls, or by plaster or metallic studs and lathing. Communications with stairways and elevators on each floor must be protected by approved tin-covered doors and fire-proof sills. Windows and entrances on exposed sides of building must be protected by approved tin-covered shutters or tin-covered doors. Walls of flues must be at least 8 inches thick, and must be lined with fire-brick or with well burned clay or cast-iron, and the throat capacity of the flue, if steam boilers are used, must be not less than 96 square inches. All floor timbers must be kept at least 4 inches from outside of flue. The building is assumed to be heated by steam and lighted by gas. The cornices must be of incombustible material, and the roof must be of metal or tiles. If partitions are hollow, they must have fire stops at each floor.

The basis rate for a standard building in a standard city is 25 cents of annual premium on each \$100 of insurance. This is equal to 5s. per £100.

Deviations from the standard city involve extras, which are carefully graduated so as to take account of each defect, and to admit of no dubiety as to what reduction in the rate would be granted in the event of the defect being remedied. Thus no city remains penalised after it has carried out improvements bringing it up to the standard; and each improvement secures a corresponding reduction in rate.

The key rate for a standard building in the particular city having been arrived at, the next step is to add the charges for any deviation from the standard building, and for exposure. To the total rate thus obtained any extras are added arising from the effect upon the hazard of the building of the ignitibility and combustible character of the occupancy. If the insurance be on contents, a further addition, regulated by the class of contents, is made in respect that stocks are much more liable to water damage as the result of attempts to extinguish the fire than buildings are, and that some stocks are seriously affected by smoke damage or by hasty removal.

From the total rate arrived at by application of the foregoing principles, deductions are allowed in certain cases—(1) for occupancy entirely or mainly as dwellings or as offices; or (2) for exceptionally good fire extinction appliances, or close proximity to public fire appliances.

As showing the elaborate character of the differentiation under the Universal Mercantile Schedule of the various elements which make up the total hazard, I may state that before the rate for the building as unoccupied is arrived at, 127 points have to be considered in some cases; and that about 1200 different trades, and 1600 different kinds of goods are enumerated and classed in the lists forming part of the Schedule.

Up to this time I have referred to Fire Insurance Tariff Associations in the abstract; but it will now be convenient, in connection with the remarks which I have yet to make, that I should select a concrete example of a Tariff Association. I accordingly give here some particulars relating to the Fire Offices Committee, which is the Tariff Association for the United Kingdom.

The Fire Offices Committee has been in existence, nearly in its present form, for forty-five years. It now includes in its membership 72 Companies, whereof 41 (36 home and 5 colonial and foreign) doing direct business are full members, and 31 (1 home

and 30 colonial and foreign) doing re-insurance business alone are associate members in a separate class, but equally bound with the full members to follow the rules and tariffs. The 36 home Companies doing direct business have fire premium incomes amounting to a total of £21,524,000, which sum represents an average of nearly £600,000 for each Company. The majority of these 36 Companies transact foreign and colonial business, and do not publish the amount of their home business, but I think I shall not be far wrong if I estimate the total home fire premium incomes of these 36 Offices at £7,000,000, representing an average of £194,000 for each Office.

The Non-Tariff Fire Insurance Companies in the United Kingdom are 18 in number, and their total fire premiums incomes (probably all, or nearly all, from home sources) amount to £227,000, giving an average premium income for each Company of £12,600. It would thus appear that the home fire premiums received by the Tariff Offices in this country are thirty times the amount of those received by the Non-Tariff Offices.

The work performed by the Fire Offices Committee, and by other organisations more or less directly connected with it, or under its control, may be briefly summarised thus:—

(1) Dealing, after due investigation, with applications for admission to membership.

(2) Framing and revising Rules defining the constitution of the Committee and its powers, and the obligations and privileges of its members; also Rules regulating re-insurance business, arbitrations, and commission to agents, and General Rules applicable to all tariffs.

(3) Collecting statistics of the aggregate experience of the Offices in the case of any classes of risk under consideration by the Committee.

(4) Framing and revising tariffs, and in connection therewith giving special consideration to the question of improvements lessening the fire hazard.

(5) Rating, individually, certain large risks, and drawing up and revising lists of warehouses with rates applicable thereto.

(6) Supervising, or administering through committees representing the Offices, the work of such bodies as the London Wharf and Warehouse Committee, the London Salvage Corps, the Liverpool Salvage Corps, and the Glasgow Rate and Salvage Association.

(7) Investigating new or altered processes of manufacture, or of lighting, heating, or "power"; and questions relating to fire extinction appliances and automatic sprinklers, and to the effect upon the fire hazard of the mode of construction or size of buildings; and taking the opinions of electricians, chemists, architects, engineers, and other experts for the guidance of the Offices

(8) Considering forms of policy and conditions of insurance, and taking the opinion of legal experts thereon.

(9) Investigating all cases of alleged breaches of tariff, and dealing with these.

(10) Watching over legislation in matters any way affecting Fire Insurance business; and corresponding through the chairman or secretary with public bodies and trade associations on matters relating to the business.

Under the existing constitution of the Committee the chairman must be entirely unconnected with any Fire Insurance Company, and he has no vote. It is permissible that he be a salaried officer of the Committee, and that besides acting as chairman at the general meetings and sub-committee meetings, he should be the chief executive officer of the organisation, and should give his whole time to the work of the Committee. It is not laid down in the rules that he must be a lawyer, but the present chairman, and the secretary and assistant-secretary are all barristers, and very great advantage has accrued to the Fire Offices Committee from the legal training of its executive officers, and from the tactful, impartial, and unprejudiced attitude taken up by them in times of difficulty. The Fire Offices Committee has been exceptionally fortunate in its executive officers, especially in its present excellent chairman, Mr. Henry Ernst Hall, who, before being promoted to his present position, was for a number of years secretary to the Committee, and is thus familiar with every detail of the work. This probably explains the remarkable circumstance that although the Committee is held together by the most slender of cords, although it might be dissolved by common consent at any moment, and although any individual Company is at liberty to withdraw from the organisation on giving three months' notice, no Company within my recollection has ever withdrawn, unless in connection with its absorption by another Tariff Company, and the Committee to-day is more harmonious, more determined to support good practices, and more

strongly impressed with the necessity for keeping rates on a basis which, while adequate, is as moderate as possible, than at any former period of its history.

Of the various functions performed by the Fire Offices Committee, not the least useful to the public, although only in an indirect way, is the investigation of the financial condition and constitution of the Companies applying for membership. It may be safely said that no Company of the type of the Star Fire and Burglary Insurance Company, by which considerable loss has been caused to policy-holders, would have passed the scrutiny of the Fire Offices Committee. It would almost seem as if the vocation of promoter of new Insurance Companies was as much in evidence now as in the days before the disastrous Life Assurance failures, which led to the passing of the Life Assurance Companies Act, 1870, in the interests of the public. In connection with a paper which I wrote in 1887 on the progress of Life Assurance business during the first fifty years of the reign of Queen Victoria, I ascertained that in the quarter of a century immediately preceding the passing of the Act referred to, no fewer than 239 new Life Assurance Companies were established, while in the sixteen or seventeen years after the passing of the Act only eleven Companies were established. From examination of the lists of new Insurance Companies registered annually, as printed in the Post Magazine Almanac, I find that from 1st January, 1887, to 31st December, 1902, out of a large number of new Insurance Companies registered (of which only an insignificant number took powers to do Life business) as many as 290 included fire insurance within their objects. Of these, many took powers to do all kinds of insurance business, excepting *life*, this being, obviously, in order to avoid the statutory deposit of £20,000 required in the case of every new Life Assurance Company. In various instances it seems clear from the name of the Company that fire insurance was a mere adjunct. We have, for example, the Keys Registry Insurance Company, the House to House Cycle Cleaning Company, various Plate Glass, Burglary, and Accident Companies, and the Provident Bounty Insurance Company for granting insurances payable on the birth of twins; but all these, and indeed the whole 290, took powers to do Fire Insurance business. Let us hope that only the *bonâ fide* cases among them have got, or will get, beyond the registration stage. This, however, is probably a vain hope. If only there were some statutory regulation requiring new Fire

Insurance Companies to deposit £20,000, or even £15,000, with Government as a guarantee of good faith, this would be of great advantage to the public. Meanwhile, the best advice which can be given to members of the public who contemplate effecting fire insurances with a new Company, is to enquire if the Company has been admitted to the Fire Offices Committee, or, if it is a Non-Tariff Office, to make sure that it is able to show a paid up capital of at least £15,000 invested in safe realisable securities.

An Insurance journalist once wittily described the history of a cycle of Fire Insurance business somewhat as follows:—

Good rates: Good profits;
Good profits: More Companies;
More Companies: Keener competition;
Keener competition: Companies fail;
Companies fail: Good rates;
Good rates: Good profits;
And so on.

If there were no tariffs, this graphic description would probably represent the actual sequence of events in a business so speculative and so deceptive to sanguine people as Fire Insurance; and even with all the advantages of the tariffs, we sometimes come perilously near to the journalist's picture. On the whole, however, taking an average of years, the Tariff Offices, and to a large extent the Non-Tariff Offices and also the public, enjoy better fortune than that represented in these couplets.

The existing tariffs applicable to home fire business are 73 in number, whereof 53 apply to specially-named classes of risk throughout the country, and 20 apply to risks of more or less varied character in certain-named towns. There are also separate arrangements for rating two individual classes of risk under agreements which are not embodied in tariffs.

In the earlier days of the Fire Offices Committee there was some tendency towards panic legislation—as, for example, after the great fire in Tooley Street, London, and after a succession of cotton-mill fires in Lancashire which entailed very heavy losses on the Companies. On these occasions the Offices tried to establish rates which would not only provide for the current rate of fire loss, but would also enable the Companies to recoup their past losses in a moderate number of years. This, while right enough as a matter of abstract justice, was not altogether prudent as a matter of policy, and it led to the formation of new Companies on

the non-tariff principle, and enabled these new Companies to obtain fairly strong positions from the start. In later years the Fire Offices Committee has been less ready to raise rates, and has never, or hardly ever, gone beyond what the future outlook very amply warranted; and a marked feature of the policy of the Committee has been to so arrange the rating that the best risks receive due consideration, and only those risks presenting unfavourable features are penalised.

Here I may just touch upon one little blemish in the tariff system which will doubtless disappear after the Companies have adopted a more systematic and detailed classification of risks for statistical purposes. I refer to the circumstance that there is generally more or less of guesswork in the extras required under the various tariffs. In nearly every case the average total rate, including extras, required under a tariff, corresponds closely with the overhead rate brought out by the statistics; but the individual extras for the various items of additional hazard are based on guesses.

As an illustration, let us take the case of the Woodworkers' Tariff (Scotland). It was based on statistics, and was devised to secure a rate of premium sufficient to meet the losses and expenses and leave a moderate profit, and on the average it has fulfilled these requirements. It is, however, a somewhat elaborate tariff, with a large number of extras for the different elements of additional hazard. Common sense tells us that each one of these items of hazard is the proper subject for an extra premium; but we are unable to prove in the case of any single item—such, for instance, as the extra premium of 2s. 6d. for a pipe stove in a joiner's shop—that the particular extra named is exactly right.

While, however, these individual extras are based on guesses, it must be remembered that they are the guesses of men of wide practical experience and matured judgment, and that the extras are put on not so much with the object of securing additional money for the Companies, as with the idea of directing the attention of the insured to the element of hazard, and offering him an inducement to remove it, and thus to effect a saving on the amount of premium. In this way an enormous amount of benefit has been conferred upon the public through the lessening of fire waste due to improvements made in order to secure a reduction in the insurance premium. It is a mistake to suppose, as many do, that a reduction in fire waste is a benefit wholly or mainly to the

Insurance Companies. The Companies, if they looked at the matter from a purely selfish point of view, might prefer to have more frequent fires and bigger rates. But fire losses fall ultimately upon the general body of the insured and not upon the Companies, these latter being merely the instruments for distributing the losses which must ultimately be met out of the premiums; and no cheaper or more effective mode of distributing these losses than that afforded by the existing system of fire insurance is ever likely to be found.

In regard to the improvement in fire risks in the United Kingdom, brought about through the operation of tariffs, it may be stated that modern mills and warehouses and modern municipal regulations and Building Acts bear unmistakably the impress of the tariffs and of the other regulations of the Fire Offices Committee. On this point I cannot do better than give two quotations from remarks made by the late Mr. M'Candlish (who was associated with the Fire Offices Committee from its commencement) and by Mr. Kingsley of the Royal Insurance Company. Mr. M'Candlish said:—

> "Many years ago an increase of rates, following on heavy losses on Liverpool warehouses, drew the attention of the merchants of Liverpool to the defective condition and management of their warehouses. An Act of Parliament was passed for their better regulation, and the result was an early return to reduced rates of insurance. At a subsequent period it was discovered that many fires in Dundee were due to the doors and windows of flax warehouses being so imperfectly constructed that evil-disposed persons could and did set fire to the loose flax which was bulging out into the public roads and passages, and through this the fire was communicated to the whole contents of the warehouses. The Offices, as a body, required all doors and windows of flax warehouses within fiteen feet of the ground to be carefully guarded by sheet iron, or failing this that an extra premium should be paid. With some grumbling the regulation was complied with, and although the prescribed additional premium became a nullity, the risk of fire was so lessened that the business which formerly yielded heavy loss became profitable."

Mr. Kingsley gave an example of the improvement of a Cotton Mill risk as the result of the tariff. He said:—

> "In 1865 the blowing and mixing were inside the mill in non-fireproof compartments. The counts spun were 'not less

than 20's,' the risk coming under the category of Class III. In 1873 it was suggested to the insured that a considerable saving would be effected if the blowing and mixing were removed from the mill. This was done, and these processes were relegated to fireproof compartments communicating with each other by an iron door, and with the mill by a 10-feet fireproof passage with an iron door at each end. In 1875 it was suggested that a slight re-arrangement of the machines would allow the greater portion of the premises to be rated as a second-class mill, thus saving 5s. per cent. This was carried out, and the lower counts were confined to certain buildings. In 1882 the blowing and mixing were more completely separated, thus securing a reduction of 7s. in the rate per cent. for the latter process. In 1896 sprinklers and electric light were introduced, with, of course, corresponding effect upon the rate. . . . The mill is fireproof throughout to-day; and the whole history of the risk furnishes a remarkable instance of the direct effect upon a risk of tariff rating."

I shall not attempt to go through the tariffs individually to prove what is well known to all Fire Insurance men, namely, that the general principle embodied in nearly all the tariffs is to so adjust the rating as to give a large benefit to those of the insured who adopt fireproof construction, or who introduce fire extinction appliances or sprinkler installations, or who in other ways materially lessen the ordinary fire hazard. I may, however, draw attention to one tariff, that applicable to farm stock, which, although based on statistics, is too simple and not sufficiently discriminating, while giving on the average a reasonably safe but moderate rate. This tariff does not offer the inducement which one would like to see placed before the farmer, to lessen the risk by dividing the stack yards, and keeping the stacks away from roads; and it makes no distinction between districts within reach of public fire extinction appliances and those remote from such; or between districts frequented by tramps, and those which are free from that fruitful source of danger. We must hope that these defects will ere long be remedied by the Fire Offices Committee.

Tariffs, however perfect, deal only with the physical hazard. They can scarcely be extended to deal with want of cleanliness, over-crowding, carelessness, and the numerous other defects of management which border upon moral hazard. Hence, supposing that all risks were already scheduled and rated according to their

physical hazard, the fire underwriter would still have important duties remaining to occupy his attention in connection with the moral hazard and with the additional points above referred to, which are scarcely susceptible of being scheduled and rated according to a scale of extras.

But this is somewhat of a digression. Returning to the summary of the work of the Fire Offices Committee and the other organisations associated with that Committee, I may draw attention to the important services rendered by the London Salvage Corps, and by the similar bodies in Liverpool and Glasgow.

Fire Brigades are intrusted primarily with the duty of saving life and preventing conflagrations. With these important objects as their first consideration, it will be understood that they can scarcely be expected to occupy their time with removal of goods which are endangered by an outbreak of fire, or even to do anything towards the protection of such goods from water damage. But in great centres where there are vast aggregations of valuable goods liable to injury or destruction or to theft on the occasion of an outbreak of fire, it has been found of the greatest service to have a corps of experienced salvage men, ready to turn out immediately after the Fire Brigade has begun operations, and to give their services in removing goods or in covering them with tarpaulins, or in watching the salvage until it can be removed. In Liverpool, where the salvage consists, in a large number of cases, of cotton, the Tariff Offices have erected premises fitted with kilns, presses, and machinery necessary for handling cotton salvage. In these premises the damaged cotton is carefully dried, picked, selected and pressed, and is then sold in the markets by a broker employed by the associated Offices. This arrangement enables the Companies to take over all cotton salvage from the insured, thus avoiding risk of dispute with the insured and enabling the Companies to get good value for the salvage, instead of getting little or nothing for it, as would be the case if the cotton were sold in its damaged condition.

Good service has also been done by salvage men in conducting inspections of warehouses and other risks on behalf of the associated Offices. In cases where there are numerous tenants in one building, or where, from the magnitude of the building, many Insurance Companies have insurances on building or contents, there must necessarily be an enormous multiplication of work if each

Company interested sends a surveyor periodically to inspect the risk. This is obviated by the employment of salvage men in their spare time in making such inspections. By dividing the city into districts a few salvage men can save much labour to the officials of the Companies, and what is of more importance, can save intolerable annoyance to the occupiers of the buildings. From a paper by Mr. Postdown, formerly at the head of the Glasgow Salvage Corps, it appears that during the six years ending 31st December, 1897, 1048 large buildings in Glasgow, occupied by 5681 tenants, were inspected at regular intervals by salvage men, with the result that 10,298 defects affecting fire hazard were discovered, and nearly the whole of these were remedied on their being pointed out to the owners or occupiers. This must have had a material effect in lessening the fire waste in Glasgow. The establishment by the Companies, in other great cities, of organisations for salvage and inspection purposes would seem to be a development which may be looked for in the course of time if it can be shown that the expenditure involved is likely to prove remunerative to the Offices.

In regard to legislation, most valuable services have been performed by the chairman and individual members of the Fire Offices Committee in watching over bills introduced into Parliament, and making representations in the proper quarters in regard to those which appeared likely to affect Fire Insurance Companies unjustly.

One matter frequently crops up in municipal and other bills, namely, the proposal to tax Fire Insurance Companies for the maintenance of Fire Brigades, or to tax each owner and occupier who has had the misfortune to have an outbreak of fire on his premises for the services which the Fire Brigade has been called upon to render in his individual case, leaving it to such owner or occupier to recover the charge from the Insurance Company if his property is insured. The executive of the Fire Offices Committee have been very successful in getting such proposals withdrawn or rejected. To this end they have expended much labour in drawing up statements for circulation among members of Parliament, representing the sound, commonsense view of the case, namely, that it is the duty of municipalities and other similarly constituted bodies to provide for fire extinction in the same way as they provide for police protection, sanitation and water supply, and that the proper method of meeting the cost is by an assessment on the ratepayers

without regard to whether an outbreak of fire, or a burglary, or a fever has occurred on the premises. They have also endeavoured, and hitherto with success, to show that it is no more the duty of the Fire Insurance Companies (unless in the few cases in which this duty is unjustly imposed upon them by law) to pay for fire extinction than it is the duty of the Life Assurance Companies to pay for the upkeep of the Public Health Department, or for improved drainage and better water supply, or for fire-escapes and life-boats; or than it is the duty of Burglary Insurance Companies to pay for police protection. But while the work of the Fire Offices Committee in this direction has been admirably done, it has been seriously hampered by the circumstance that in earlier times the individual and collective action of the Insurance Companies was such as to convey to the minds of the public that the Insurance Companies considered it to be their duty to bear the cost of putting out fires. In the early days of Fire Insurance business each Company had its fire-engine, and the plates then affixed by the Insurance Companies to buildings served as indications of the source to which application had to be made for assistance in extinguishing any outbreak of fire.

In the year 1833, ten of the leading London Fire Insurance Companies became seriously alarmed at the utterly inefficient protection against fire in the centre of London, where enormous quantities of valuable goods were stored within a small area, and where, if an outbreak of fire once gained a foothold, serious disaster might result. Accordingly these ten Companies established what was called the London Fire Engine Establishment and they were subsequently joined in this enterprise by a large number of other Fire Insurance Companies. Their object was solely to protect insured property in the congested part of the city. Ultimately, however, especially after the establishment was placed under the charge of Mr. Braidwood, the great pioneer of modern Fire Brigade work, the services of the establishment were given in any part of the city, on their aid being requested, as no distinction whatever was made by the establishment between insured and uninsured property.

About the end of the year 1862 the Fire Insurance managers and their boards of directors felt themselves compelled by force of circumstances to reconsider the whole situation. The demands of the public for increased protection against fire were clamant, and compliance with these demands would have involved the Companies

in enormous expenses. As the result of re-considering the whole matter the Companies became alive to the fact that they had placed themselves in a wrong position by assuming duties which ought to have been undertaken by the public authorities at the expense of the ratepayers. The Offices accordingly intimated to the Home Secretary of the day that they had determined to relinquish at an early date the establishment which they had founded and maintained at so great an expenditure, but that they would be glad to transfer the whole establishment on liberal terms to a constituted authority. After protracted negotiations the transfer was made, the Companies handing over their whole plant and freehold and leasehold premises, valued at £30,000, without any payment or compensation. This was not all; for, sad to say, the Insurance Companies (not having then a chairman with legal training to keep them right) allowed themselves to be concussed into paying as a compromise by way of contribution to the expenses of the Fire Brigade an annual sum equal to £35 on each million sterling insured in the Metropolitan District. At that time the agreed-on rate per million yielded £10,000 a year. It now yields £34,125. This seems an enormous price to pay for getting rid of a burden which the Companies were not bound legally or morally to assume, but which had been undertaken by them as a voluntary act.*

In other places besides London, local Fire Engine establishments belonging to the Offices were handed over to the municipalities, following the precedent of the Metropolitan establishment.

Unfortunately the historical position of the Companies led, in a few cases, to legislative recognition of the erroneous view that Insurance Companies were bound to pay at least part of the cost of fire extinction. Under the Liverpool Improvement Act, 1842, the Insurance Companies are required to pay a share of the cost of the local Fire Brigade in respect of extraordinary expenses incurred at fires, defined as wages of fire police consequent upon the occasion, pay of further assistants, wear and tear of engines and utensils, and damage and injury. For the ten years from 1st June, 1893, to 31st May, 1903, the liability of the Tariff Offices

* It will scarcely be credited that up to the year 1867 the protection of of life from fire was undertaken in London by a private Society, supported by voluntary subscriptions; but in that year this duty was transferred to the Metropolitan Fire Brigade. In 1882 it was stated that the life saving branch of the Fire Brigade's work cost £18,000 per annum. The cost is probably much greater now.

was fixed by agreement between the Offices and the Corporation at £1000 per annum. The agreement has not yet been renewed, and the authorities are now sending in individual accounts against the Offices. At Manchester the owners of property endangered by fire are liable, under Act of Parliament, for the actual expenses incurred at fires, and for a reasonable charge for the expenses of maintaining the Fire Brigade, use of engines, attendance of fire police, and "use of water for salvage purposes." There is just a touch of irony in this last item, which will be appreciated by all who know anything of the work of the salvage men employed by the Offices to protect goods from the water damage caused by the operations of the Fire Brigades. The Tariff Offices pay £2000 per annum to the Manchester authorities in commutation of the liability of their insured under the Act. At Salford the Tariff Offices contribute £400 per annnm in commutation of a similar liability. At Ashton-under-Lyne the authorities have power to make a charge for attendance of the Fire Brigade against the owner of a house where a fire happens. At Stockport the authorities have power to make a charge upon the owners of property *endangered*, but only for *extraordinary* expenses as in the case of Liverpool. At Oldham, although there is no statutory power to make a charge, the Tariff Offices have agreed to pay a certain scale of charges. By the Towns Police Clauses Act, 1847, owners and occupiers of lands and buildings *beyond the limits defined in any special Acts obtained for Towns or Districts*, are declared to be liable for the actual expenses incurred in extinguishing fires, with a reasonable charge for the use of engines and attendance of firemen. At Birmingham, Newport (Monmouth), and Sunderland, voluntary contributions have been made by a number of Companies. The practice of Offices differs in regard to voluntary payments for attendances at fires; but many Companies, while persistently denying that there is any legal or moral claim upon them, pay more or less grudgingly the reasonable, and often unreasonable, charges for brigade services rendered *outside* the areas to which the brigades belong, and sometimes also for those rendered *within* these areas.

Apart from the cases mentioned above, there are no statutory powers in England and Wales enabling local authorities to compel Insurance Companies to contribute towards fire extinction expenses

In Ireland the Towns Police Clauses Act, 1847, applies generally. In Belfast there is power to tax Insurance Companies

in respect of insured property, and owners and occupiers in repect of uninsured property for extraordinary expenses incurred, and the Tariff Offices have agreed to a scale of charges. In Dublin there is a charge authorised on owners and occupiers within the city for each outbreak of fire of £15, or whatever less sum may represent *half of the actual expenses*; and where the fire occurs outside the city limits *the full expenses*, with a further sum for the use of engine, &c., may be charged.

In Scotland, under the Burgh Police Act, 1892, there is no power to make a charge in the case of a fire occurring within the burgh (the former charge within the burgh, similar to that in the Dublin Act, having been abolished by the 1872 Act), but outside the burgh the whole actual expense, with a reasonable charge for the use of engine and attendance of firemen, may be recovered from owners and occupiers. In Dundee there is power to charge on a basis similar to that in Dublin. In Aberdeen, Glasgow and Greenock the power to charge is similar to that in Dundee and Dublin, excepting that outside the city limits the whole actual expenses, *plus* an extra 25 per cent., may be charged by the two first-mentioned cities, and 50 per cent. by the last.

In all other cases in Scotland the entire cost of extinguishing fires within burghs has been left to be provided for out of the Rates in the same manner as that laid down by the Towns Police Clauses Act, 1847, and Public Health Act, 1875.

I have now gone into these matters in some detail, because it seems to me that there is legislative trouble ahead for the Fire Insurance Companies, and that it is all the fault of the unfortunate historical position of the matter, taken in connection with the non-existence of the Fire Offices Committee in 1833, and the fact that the Committee had not a competent lawyer as chairman during the period of the negotiations with the London Authorities and the Home Secretary between 1862 and 1865.

The general question of contributions by Insurance Companies towards Fire Brigades was before a Select Committee of the House of Commons on Fire Brigades in the year 1900, and notwithstanding the admirable evidence given by the Chairman of the Fire Offices Committee, the Select Committee reported that, after a careful review of the whole case, they had come to the conclusion that all the Fire Insurance Companies ought to be required by law to bear a certain portion of the expenses connected with fire extinction; and they added that this is an obligation already

recognised by some of the most important Companies. In regard to the arrangements for protection against fire, the Select Committee reported very adversely in regard to volunteer fire brigades (the system prevailing in the smaller towns), and stated that of 1025 urban districts in England, 116 had not sufficient hydrants, 119 had defective water supply, and no fewer than 266 were without Fire Brigades. The population in the unprotected districts amounted to 5,000,000 persons, and the rateable rental of these districts amounted to 1¼ millions sterling. They also reported that in Wales the state of matters was even more unsatisfactory. One point which the Select Committee brought up against the Insurance Companies was the fact that the Companies did not make any difference in rates between protected and unprotected towns. It occurs to me that in view of this remark by the Select Committee, and in view also of the very unsatisfactory position of many districts in regard to fire protection, as disclosed in the report, it might be proper and politic on the part of the Companies to introduce a distinction in the rating of towns according to the condition of their fire extinguishing appliances and the efficiency of their brigade, and the extent of their water supply, somewhat on the plan adopted in the Universal Mercantile Schedule, as acted on in some towns in the United States. If the Companies were to put on substantial extra rates where there is deficient protection, and to allow reductions where the protection is of the best class, this would place the Insurance Companies in a better position in the event of a bill being brought into Parliament on the lines recommended by the Select Committee.

Besides the Fire Offices Committee, which deals exclusively with business in the United Kingdom, there is a separate body called the Foreign Offices Committee, with the same executive officers, worked from the same central office in London, and largely consisting of the same members. The Foreign Offices Committee controls the tariffs and conditions of insurance in certain foreign and colonial localities in which the business is chiefly in the hands of the British Offices.

In the United States, in Canada (with certain exceptions), in Australia, and in many other parts of the world, Fire Insurance business is worked under local tariff organisations or compacts, to which, as a rule, the British Companies belong, but which are entirely independent of the Fire Offices Committee of the United Kingdom.

The greater part of the Fire Insurance business of the world is thus worked under tariffs or agreements regulating rates of premium.

In regard to the question, which may naturally be asked, as to whether the result of these tariffs is not to keep the rates of premium at too high a level and thereby to inflict loss on the public, I venture to submit the following figures, which show the actual Fire Insurance profits made during the last five years on their whole business (home and foreign) by the 36 British Offices which are full members of the Fire Offices Committee:—

Total Fire Premiums received,..............		£101,279,448
Deduct Fire Losses,...........	£60,405,314	
Expenses, Commission, and Taxes,.........	34,922,920	
Increase on unexpired risk, taken as 40°/₀ on the increase in the premium incomes,..	1,045,889	
		96,374,123
Fire underwriting profit,................		£4,905,325

This profit represents 4·84 per cent. on the premiums; and it is an over-estimate rather than an under-estimate, because the increase on unexpired risk ought probably to have been taken as more than 40 per cent. on the increase in the premium incomes. That rate was taken in the calculations because it is the rate adopted in the accounts of some of the principal Offices.

It could not be maintained that the shareholders would have received excessive renumeration if even the whole of the underwriting profit had been appropriated as dividend in addition to the interest yielded by the invested funds. But such a course would have been extremely imprudent, as may be judged from the following analysed statement showing the rate of fire underwriting profit for each year of the period;—

1890,..............................	4·74 °/₀
1899,..............................	1·52 °/₀
1900,..............................	4·39 °/₀
1901,..............................	2·44 °/₀
1902,..............................	10·24 °/₀

For the first four years the average underwriting profit was thus only 3·27 per cent., but the exceptionally good results of 1902 brought up the overhead percentage of profit to 4·84 per cent. A great part, however, of the 1902 profit was added to the reserves of the Companies, these having been more or less depleted by the results of the years 1899 and 1901.

Looking to the great fluctuations in Fire Insurance business, and to the necessity for building up a conflagration fund, which has been demonstrated in the experience of the largest and oldest Companies, it seems doubtful if Fire Insurance Companies would be justified in appropriating towards dividend more than from one-third to one-half of the average profit on fire underwriting. The principal British Companies appropriate towards dividend only about one-third of their average fire underwriting profits, and the principal American Companies appropriate thereto even a smaller proportion of such profits. Looking to what the actual profits have been during the last five years, it cannot fail to be recognised by any competent person who investigates the matter, that the Tariff Offices have not been aggrandising themselves by charging too high rates.

In bringing this paper to a conclusion I should like to allude to one happy feature of the Fire Offices Committee, which I have had many opportunities of observing during my long association of upwards of twenty-eight years with the Committee,—namely, its tendency to promote mutual respect and esteem among keen business rivals, and to bring about warm personal friendships where but for the existence of the Committee there might have been life-long distrust and dislike.

And now it only remains for me to express the hope that I have to some small extent succeeded in showing you that tariff associations are necessary in Fire Insurance business, and that their continued existence is as much for the benefit of the public as for the benefit of the Fire Insurance Offices.

D. DEUCHAR.

Insurance Society of Edinburgh,
20th October, 1903.

MANCHESTER SHIP CANAL WAREHOUSES.

THE creation of a port at Manchester and the erection of dock warehouses for the storage of goods has been the dream of thoughtful business men in Lancashire as far back as the year 1710, when a scheme was mooted for this purpose, but collapsed for want of enterprise, and the idea slumbered until the year 1825, when an enterprising citizen of Manchester tried to induce his fellow townsmen to embark upon a project of making a canal from Liverpool to Manchester, but the idea was not yet ripe for fruition, and for fifty years little more was done than talk and speculate upon the possibility of carrying out the scheme.

In 1877 the subject again came to the front in commercial circles, and a Mr. Hamilton H. Fulton brought before the Manchester Chamber of Commerce a proposal to construct a tidal canal from Manchester to the sea, which, however, was rejected, mainly because a canal on that principle would necessitate the docks at Manchester being so deep as to be useless, owing to the difference in levels between high water at Liverpool and Manchester.

The subject, however, had now taken hold of the minds of many of the leading commercial and enterprising men of the day, and in 1881 Mr. Daniel Adamson took up the cause, and from that time it took a practical shape, for we find that in 1882 Mr. Adamson convened a meeting of the most influential representatives of commerce and manufacture in Manchester and district, and at this meeting it was decided to form a Provisional Committee to consider the practicability of making a canal, and subscribe a Guarantee Fund for the necessary investigation and Parliamentary Enquiry. From that time until 1885, when the Act of Parliament was obtained giving power to construct a canal, the promoters had to fight every form of opposition and vested interests, but they had at last the satisfaction of seeing the reward of their labours in the Canal Bill passing Parliament, and the formation

of the Manchester Ship Canal Company in 1885 with a capital of £10,000,000 and Mr. Adamson as chairman.

It is no part of our object to follow the development of the Canal Company in its enterprise, interesting and instructive though such a theme would be, but to confine ourselves only to such portions of the Canal Company's property that is of interest to Insurance Companies in the pursuit of their business.

The opening of the Ship Canal was as important an event to Fire Insurance Companies in this district as it was to the many commercial and manufacturing industries in Lancashire and the surrounding districts, for it raised visions of great possibilities for increased revenue, and the imagination pictured new works of every description rising up along the banks of the canal, warehouses at, and about, the docks, and vast accumulations of cotton and merchandise of all descriptions brought along the bosom of the new waterway to this newly created port—all contributing to bring "grist to the Insurance Mill"; and whilst those dreams have not yet been fully realised, still, in the comparatively short time since the opening of the canal, many extensive works and new industries have been introduced, and more will follow in the immediate future; but the Dock Warehouses have become an accomplished fact, and the site of the termination of the canal, which a few years ago was green fields, park, and meadowland, has been converted, as if by magic, into docks, transit sheds, and storage warehouses containing modern argosies laden with merchandise from every clime, and it is to these Transit Sheds, Dock Warehouses and their contents, with the physical hazard attaching to them, that we desire to bring under the notice and consideration of this Institute.

The docks are divided into two sections—the Manchester Docks, called "Pomona Docks," situate on the Manchester side of the canal; and the other section is on the opposite side of the canal, about ¼-mile distant, and called the "Salford Docks."

The Manchester Docks consist of four docks, three about 600 feet long by 150 feet wide, and one 700 feet in length by 120 feet wide, with concrete piers and granite coping 120 feet wide between each dock, and each pier contains a single warehouse used as transit sheds. These sheds are constructed of iron with corrugated iron roofs, with sliding doors on each side also constructed of corrugated iron, and designated Nos. 1, 2, 3, and 4 (Goad's 233, C, D, E, and F). These transit sheds are all one

storey in height, except No. 4, which is two storeys, and they are all used for fruit and general merchandise in transit in connection with coasting vessels. A new shed of similar construction and size has recently been erected near to but detached from No. 1, called No. 1a, and situate alongside the canal and used as a transit shed for similar purposes to the rest of the sheds at this dock. Each of these transit sheds have railways passing alongside, but no locomotives are allowed to enter or pass through the sheds. No cotton is landed or stored in these sheds except occasional small consignments by coastwise steamers, and the sheds possess no special feature of hazard.

The Salford Docks consist of three separate docks known as Nos. 6, 7, and 8, with a concrete pier or quay with granite coping between Nos. 6 and 7, and another between Nos. 7 and 8, and extensive quay walls and wharfs on Nos. 6 and 8 Dock side, and on these quays there are extensive transit sheds and storage warehouses for the accommodation of cotton and general merchandise in connection with ocean going steamers, and it is at these docks that the principal interest, from an Insurance point of view, centres, owing to the size and value of the warehouses and transit sheds, and the enormous quantity of merchandise of all kinds and descriptions that has to be handled at these docks.

There are 36 transit sheds and warehouses at these docks, and to give a brief description it will be the most convenient method to take them in their order, so that the warehouses may be described in their sequence, and the use to which they are assigned. But before doing so, however, we wish to make a remark upon the technical word "transit shed," which is a term applied by the Ship Canal Company to many of their buildings; but such designation must not be understood to apply to a one storey building only, as a transit shed may contain any number of storeys, but it is a distinction made by the Canal Company between a building used for *transit* purposes and a building occupied for *storage* purposes, and any reference hereafter to the word "transit shed" must be understood to apply to a building not used for storage, no matter how many storeys the building contains, but to a building for receiving and distributing merchandise of any kind.

Taking now the warehouses at these Salford Docks, the first in order is on the south side of No. 6 Dock, and is a range of seven fireproof warehouses, all adjoining, brick built, four storeys in height,

with flat concrete roof over all. Each of these warehouses is separated by a party wall carried up to the roof, but having a communication on each floor by two fireproof passages 10 feet long, with metal-covered doors to each opening. The side of each floor of this range of warehouses fronting the dock has wooden sliding doors with a wooden tilting platform about three feet wide on the 1st, 2nd, and 3rd floors thereof, which can be dropped level with each of the said three upper floors for loading purposes, but when not in use they are fastened back in line with the building. These tilting floors are not continuous from end to end of each warehouse, as there is a brick wall three feet wide between each warehouse and such tilting floors along the entire front of the warehouses, so breaking the continuity of the timber front to the dock; but these wooden sliding doors and tilting floors nevertheless destroy the otherwise fireproof construction of this range of buildings.

These warehouses have concrete floors supported on iron beams and columns, and are used both for *storage* and "transit" purposes for general merchandise, and also for cotton-in-bales, and the flat concrete roof over all is also used for storing cotton for "transit" in case of pressure for room, but when this is done the cotton is sheeted up with tarpaulin; yet this system of storage is very rarely resorted to, owing to the danger of fire from sparks from steamers in the dock and passing locomotives.

On the opposite side of this No. 6 Dock, which is 225 feet wide, is the first concrete pier or quay, about 1000 feet long by 260 feet wide, on which a range of six transit sheds is erected, three facing No. 6 Dock and three facing No. 7 Dock, with a roadway between down the centre of the pier 42 feet wide.

Sheds No. 1 and 2 (Goad's 232 N & M) are detached from each other, one storey, constructed of corrugated iron with corrugated iron sliding doors to each side, with the roadway between, and used for general merchandise, and occasionally cotton in transit, but no cotton is *stored* in either shed.

Nos. 3 and 4 are (Goad's 232 O) three storey transit sheds and Nos. 5 and 6 are (Goad's 232 P) four storey transit sheds, forming two complete blocks but communicating with each other by open gangways. All are constructed of brick and ironwork, with concrete floors, and iron, slate, and glass roof over Nos. 3 and 4, and flat concrete roof over Nos. 5 and 6; but the sides of each shed looking towards each dock are composed of wooden sliding

doors on each floor, and on the floors above the quay floor there are tilting wooden platforms for hoisting purposes similar to those described in the south side warehouses. The roadway passes between these sheds, but this roadway is covered in with slated and glass roof, equal to the height of the sheds, but wood floors have now been erected therein on a level with the concrete floors of each of the sheds, forming an extension or intermediate building, and open thereto, making each two sheds, one risk. There are openings in each of the wooden floors of the extensions on the sides nearest the sheds, but the floor over the centre of the roadway is perfect. These openings are used for hoisting purposes, the hoisting being done by hydraulic jiggers fixed in the roof of the intermediate building.

Each gable end of the intermediate buildings between these storied sheds is open on the ground floor, but the openings in the brick gable ends of the sheds are protected by sliding doors, except the end of Nos. 5 and 6 nearest Trafford Road, which are quite open on the quay floor; but the sides above the ground floor, which until recently were open, are all built in with wired glass and brickwork.

Nos. 3 and 4 are used for general merchandise and cotton in transit, chiefly "Egyptian," and

Nos. 5 and 6 are used for landing mineral lubricating oil in casks, cut timber, general merchandise and cotton, all in course of transit.

Looking across No. 7 Dock is another pier or wharf, about 1275 feet long by 260 feet wide, containing eight transit sheds in four blocks, four facing No. 7 and four facing No. 8 Dock, with a roadway 48 feet wide down the centre.

Sheds Nos. 1 and 2 (Goad's 232 G and F) and Nos. 5 and 6 (Goad's 232 J & I) are all detached, one storey, and constructed of corrugated iron with iron roofs and having corrugated iron sliding doors on each side.

Nos. 1, 2, and 5 are for general merchandise and cotton, and No. 6 for fruit, onions, and general merchandise, all in transit.

Nos. 3 and 4 (Goad's 232 H) and Nos. 7 and 8 (Goad's 232 K) are three storey transit sheds, constructed of brickwork with concrete floors supported on iron columns and beams, with iron and glass roofs and timber sliding doors, and tilting platforms to each shed on the dock sides. There is also an intermediate building between each two sheds with wooden floors and openings

for hoisting purposes, similar in every respect to the storied sheds on the last described pier. Both these storied sheds are used for general merchandise and cotton in bales, principally American cotton, general merchandise being chiefly on the ground floor, and the cotton on the upper floors.

On the Salford side of No. 8 Dock are two more transit sheds, Nos. 7 and 9 (Goad's 232 D and 232 E), detached from each other, constructed of corrugated iron, and similar in every respect to those already described.

No. 9 is let to Messrs. Elders, Fyffes & Co., as a fruit shed, a portion thereof being separated by wooden partitions into small compartments for maturing bananas by artificial heat, which is supplied by a low-pressure hot-water apparatus, the boiler and fire-place being outside the building.

No. 7 is a transit shed for general merchandise.

Nos. 1, 3, and 5 transit sheds (Goad's 232 C) on the same quay is a fine new building four storeys in height, constructed of brick walls, with concrete floors 5 inches thick and expanded metal embedded therein, with a flat concrete and asphalted roof. This shed is 1100 feet long by 98 feet wide, divided into three equal sections by party walls up to the roof, but communicate with each other on the ground floor by large metal-covered doors, and on each upper floor by two brick passages 10 feet long with metal-covered doors at each end. The side of these sheds facing the dock consists of massive wood-sliding doors supported by metal hangers from the concrete ceilings above, and these doors are closed except when cargo is being discharged. There are also wooden tilting platforms on each of the upper floors similar to those described in the other storied transit sheds. The ground floor of this range of sheds is very lofty, about 17 feet in height, and used for general merchandise in transit, no cotton stored therein, except occasionally, and then only down the centre of the sheds. The upper floors are only 8 feet 4 inches in height, and also used for general merchandise, but principally for American cotton in bales, all in transit. The bales are placed "on end," and no piling of bales is allowed, the floors having been specially-designed not to give sufficient headway for this to be done. There is an enclosed stone staircase through the floors of each of these sheds with metal-covered doors to each doorway, but no other opening through the floors except for a hoisting recess in each, in the side of the sheds nearest the roadway.

On the flat concrete roof, cotton may be placed from time to time (when the shed floors are full), but when this is done the cotton is sheeted up until removal.

There are three sets of railway lines passing along the ground floor of the sheds, but no locomotives are allowed to enter, the haulage being done by hydraulic power.

This is the latest and largest addition to the transit sheds at this dock. The storage capacity of the entire building, including the roof, is about 80,000 bales "on end" if the building were used as a *storage warehouse*, but as it is used only as a *transit shed* it could not contain more than 40,000 bales, owing to the system adopted of leaving plenty of open alley spaces between the bales for the purpose of "lotting to marks" and quick delivery. As a matter of fact there has never been more than 20,000 bales remaining in at one time, as delivery is taking place at one side whilst unloading is going on from the dock side, and the bales being discharged and distributed on the various concrete floors of the three sections, there cannot be a large accumulation of cotton in any one section.

Behind the last-mentioned transit sheds, but separated by a roadway 50 feet wide, are two storage warehouses known as A and B blocks, separated from each other by a passage 32 feet wide and forming two distinct blocks.

Block A (Goad's 232 A) consist of eight small warehouses, Nos. 1 to 8, separated from each other by perfect brick walls, all substantially built of brick with slated roof, 7 storeys high, with iron shutters and iron doors to every opening in the building, having a stone staircase to each warehouse with iron door to each floor, and all used as storage warehouses for provisions and general merchandise. No cotton is stored in any of this range of warehouses, and no artificial light or heat used except a few enclosed hand lamps for working purposes.

Block B (Goad's 232 B) is in line with block A, and is divided into five warehouses, Nos. 9 to 13, seven storeys in height, separated from each other by party walls, and in every respect similarly constructed to block A. These warehouses are used exclusively for the storage of cotton in bale, Nos. 9 and 10 being for hard-packed Egyptian cotton, and Nos. 11 and 12 for American and Egyptian, and No. 13 for American cotton only.

This now concludes the whole of the Warehouses of the Ship Canal Company at both docks, but there is an immense new dock

being constructed at present on the site of the old racecourse at the rear of the storage warehouses A and B just mentioned, and on the quay of this new dock there will be a range of five separate transit sheds, three storeys in height, with flat concrete roofs. Four of these sheds will be 425 feet long, and one 450 feet long by 110 feet wide, each to be divided into sections by party walls and iron doors, and the most interesting feature of these new transit sheds, apart from their great size, will be their structural character. They will be built without brick, stone, mortar, wood, or girders of iron or steel. The whole of the buildings will be of Ferro-concrete, upon what is known as the "Hennebique" system. This consists of Portland cement concrete combined with steel rods and steel bands or stirrups, in such a way as to form a beam in which each of these materials shall develop the maximum of its useful properties, the concrete acting in compression, the steel in tension and compression, and the steel bands or stirrups (embedded in the core of the concrete) holding them solidly together. The walls, pillars, and floors will be of the same materials, and the doors to the dock will all be of steel. The principal advantages claimed for this system of construction are incombustibility, absence of joints, no exposure of ironwork, and the fact that sheds so constructed possess fire-resisting capacity beyond any other system of fireproofing extant—and we have no hesitation in saying that these transit sheds will be superior, as fire risks, to any dock warehouses in the Kingdom.

We merely mention these proposed new transit sheds to indicate the extension of the dock system, and the desire of the Ship Canal Company to adopt the very safest methods of construction in any new undertaking, and also to intimate that a new timber storage ground will be provided at the extreme side of the land acquired for this new dock, and this will enable the Canal Company to discontinue storing timber on the Salford Quay in close proximity to Warehouses, and thus remove a source of danger to those Warehouses which has hitherto existed.

We have now passed in review all the warehouses of the Ship Canal Company at both the Manchester and Salford Docks (except the Grain Elevator, to which we shall refer later), and at the risk of being tedious we have felt it necessary to enter into some details of these warehouses, because we hear a good deal of misunderstanding exists as to the actual use to which they are applied, and it is very desirable that all such misunderstandings or mis-

statements that may have been disseminated through imperfect information should be removed.

We have fully described the purpose for which all the buildings are used, because it is essential that this should be borne in mind in estimating the fire hazard, for the nature of the goods handled or stored forms an important factor in this connection, and on enquiry we find that the principal goods imported into this port are as follows, viz.:—

Timber,
Grain,
Cotton,
Fruit,
Paper, and
Paper-making materials,

also a large quantity of general merchandise; but one of the largest imports is cotton, and in the near future it will in all probability be considerably more than at present, as the cotton growers and spinners realise the advantages offered by the Ship Canal Company for direct importation to Manchester.

The following Table of returns, taken from *Cotton* shows the rapid development of the cotton imports to these docks. viz.:—

COTTON IMPORTATIONS TO MANCHESTER.

	Bales. Season, 1896-7.	Bales. Season, 1897-8.	Bales. Season, 1898-9.	Bales. Season, 1899-0.	Bales. Season, 1900-1.	Bales. Season, 1901-2.	Bales. Season to 4th April, 1903. Full Season being 1st Sept. to 31st Aug.
American, -	211,632	245,853	311,003	415,000	442,695	420,865	414,941
Egyptian, -	88,021	98,563	84,627	136,750	107,178	125,617	130,448
Total, -	299,653	344,416	395,630	551,750	549,873	546,482	545,389

This last return is only up to 4th April, but the season does not close until 31st August, and as the quantity imported up to April is practically equal to last season's import, it is probable there will be a large increase at the end of this season.

This cotton consists of Egyptian and American, the larger

proportion being American, which arrives in more or less damaged packing with cotton protruding from the bales, as is usual with American packed cotton, and this feature forms the most important hazard in connection with the handling and storage in these transit sheds and warehouses. The cotton is delivered from the ship's side direct into the various transit sheds by hydraulic and electric cranes, but none of these transit sheds are used for *storing* purposes; the custom of the Canal Company is to use these sheds for receiving, lotting, handling, and delivering the cotton as quickly as possible, and as the extent of the Canal Company's time limit for the free use of the transit sheds is 72 hours, the cotton has to be delivered or removed in that time, if not, a penalty rent is charged upon what remains. But the Canal Company will not allow cotton to remain for a longer period than 14 days from the date of landing. If not removed within this limit, it is taken away by the Canal Company and stored in the storage warehouses A and B or one or other of the seven warehouses on the south side of No. 6 Dock, or in the Bridgewater Canal Company's Warehouses.

This question of "transit" and "storage" of cotton is of vital importance in estimating the risk of these warehouses, and as some misapprehension exists, and reports made on the assumption that all are for cotton *storage*, we wish to repeat in the most emphatic manner, on the authority of the Canal Company, that such is not the case, and that all the transit sheds mentioned are used only as temporary resting places for goods being discharged from, or exported by, vessels lying alongside the quays. The only buildings used as storage warehouses for cotton or other goods are those three blocks already referred to, and which are small, compact, substantial buildings, constructed in accordance with the certified Warehouse Rules, and cotton is stored therein under the same conditions as exist in the certified warehouses in Liverpool.

The transit sheds are not of the same substantial character as the certified warehouses; for instance, the corrugated iron sheds have sliding corrugated doors which do not entirely fill up the openings, and the brick-built storied sheds have all wooden sliding doors to the docks, and these doors in many cases leave openings through which sparks from the funnels of steamers might pass and fall on to cotton protruding from bales, and these are important features to bear in mind in considering the risk to which

cotton may be subjected whilst in these sheds; but this risk is very much minimised when it is remembered that the cotton may be received from the dock side into the sheds and cleared by trucks and carts the same day, or at most within the time limits before-named, and it is not at all an uncommon thing to find the whole of the floors practically empty of cotton in a very few hours after a steamer has been discharged, thus very much reducing the risk of fire in comparison to what might occur if the sheds were used for *storage purposes.*

The whole of the transit sheds, warehouses, and quays are lighted by electricity—incandescent lights in the warehouses, and arc lights (enclosed) on the quays. No artificial heat is used, and smoking is strictly prohibited on pain of instant dismissal. The management generally is very strict. The rooms of the sheds are swept up after each vessel has loaded or discharged, and all rubbish is removed and placed in brick pits outside the end of each warehouse, the open spaces between the gable ends of each block of sheds are kept free from empty boxes, barrels, and other such combustible materials generally found on quays.

There are, however, several small wooden offices adjoining the gable ends of some of the transit sheds which have very objectionable oil or fire stoves. The pipes from the latter are only carried a few feet above the roof of said offices, and as there are doorways in these gable ends not always close-fitting or closed, there is great danger of sparks from these stove pipes blowing into the sheds, and this is a feature which ought to be discontinued.

We will now pass over the Canal to Trafford Wharf, to the last building belonging to the Canal Company, to the

"GRAIN ELEVATOR,"

which is about a quarter mile from the transit sheds at No. 8 Dock, and nearly opposite the entrance to the new dock.

This grain elevator was the first in this country to be constructed entirely on the American principle, and was built by Messrs. J. A. Metcalfe & Co., of Chicago, after the fashion of American elevators; *i.e.*, a wooden skeleton of the whole building being first erected and afterwards encased or enclosed in brickwork.

It stands about 340 feet from the quay wall of the canal, and is seven storeys in height throughout, with a central tower of

13 storeys. It contains 226 bins, each 15 feet square, and about 70 feet deep, holding from 37 to 300 tons,the full storage capacity of the building being 40,000 tons, or 1,500,000 bushels of grain.

These bins are constructed of 2-inch planks laid horizontally and spiked together, the whole surrounded by a timber wall of 2-inch planks laid flat and nailed together on post beams and framing, being enclosed in 9-inch brick walls with brick piers, built independently of the bins, and all securely tied to the timber framing. The centre tower is formed of wood framing covered outside with 1-inch jointed flat boards covered with ordinary tiles, the roofs being all slated on boardings.

This building is a receiving place for grain in bulk, and all grain brought to Manchester by the canal is discharged at a timber marine tower on the quay by means of several metal exhaust pipes and by a marine leg in said tower with revolving buckets attached, which lifts the grain out of the holds of the vessels, raises it to the top of the tower, then passes it downwards into a weighing hopper, where the weight is recorded, and passed automatically on to a travelling band through a timber-built conveyor gallery into the elevator building; thence it is lifted to the top of the central tower by elevators and distributed to one or other of the 226 storage bins for delivery as required.

The appliances for the delivery of grain to railway truck, cart, or barge are very complete, the grain being conveyed on travelling bands from the storage bins, sacked, weighed, and loaded on to waggons or carts, all under cover. If it is required to be delivered into barges, it is carried along similar travelling bands through a timber enclosed conveyor gallery, at the west end of the building, to the quay, and thence shot into the hold of the barge at the rate of about 140 tons per hour.

The distributing bands and machinery for the work just mentioned are partly on the ground floor and partly in the top floors of the central portion, and are of a very heavy character, worked by steam power from boilers outside the building, and all the gearing is carefully supplied with oil-cups for constant lubrication. There are a few screening machines, or grain-grading machines more properly, and a large amount of dust and small refuse is given off in the process of elevating, distributing, and discharging the grain, but the rooms are kept as clean as consistent with the trade; no rubbish is allowed to lie in or about any of the floors, which are constantly being swept, and sweepings

removed by means of a Cyclone Dust Collector fitted inside the building.

This building is lighted by electricity, and has been fitted with a complete automatic sprinkler installation, and in addition there are on each floor hydrants all fixed with hose ready for attachment, also fire buckets filled with water. There is a Fire Station in the yard with a fireman on duty day and night; a Worthington Steam Fire Pump, with three deliveries attached in a Pump House, with a 6 inch water main laid round the entire building, and 13 hydrants thereon, the main being fed with water pumped from the canal, and also a town's main with hydrants on the Trafford Wharf Road. In the Fire Station there is sufficient hose to command the whole of these premises, and telephonic communication to the Salford Fire Station, also a Gamewell Fire Alarm Indicator, and in addition to the precautions adopted by the Canal Company, this Elevator is inspected by two Fire Office Surveyors every three months and reports sent to the Fire Offices' Committee on the general conditions of the building and machinery, and also special reports on the electric lighting and sprinkler installation by the same set of Surveyors.

There has not been any fire at the elevator, and the fire experience of these risks in England has hitherto been very good, but the experience of Elevators in America has been very disastrous; the risk arising, we understand, chiefly from friction in connection with heavy machinery and travelling bands, combined with the dust which is given off and settles on the gearing and working parts of the machinery, and as this building has been erected on the American system, a mass of timber with wooden elevators and wood spouts through all the floors, we can easily recognise the destructive nature of a fire in such a risk, if it is not extinguished, in its inception, by the automatic sprinklers or other extinguishing appliances provided.

Timber.

As previously mentioned, timber is another large import into Manchester by means of the Ship Canal, but it is not stored in any of the Canal Company's warehouses or sheds, except small quantities of finished wood goods; still, the storage of large piles of such inflammable material on any part of the Dock Company's premises might be considered a source of danger to the warehouses if such storage was in close proximity, and in this

connection it is perhaps necessary to indicate here where and how this class of "imports" is located, so as to remove any misconception on this point.

The timber imported consists of logs, balks, deals, and planks, which are landed direct from vessels and stored in five separate and distinct storage grounds at some distance from any of the warehouses, and are as follows, viz.:—

The 1st storage ground is on the Trafford Wharf, commencing about 50 feet from the Grain Elevator, and extending about half-a-mile along the canal side up to the Railway Swing Bridge, and bounded on the one side by the Canal and on the other side by Trafford Wharf Road.

The 2nd storage ground is on a large open space at the Salford New Dock on the opposite side of the Canal to the Trafford Wharf storage. This storage ground is enclosed within the dock fencing, and will soon become the largest timber storing place in connection with the Canal Company.

The 3rd storage ground is near the last mentioned, but on the Canal bank extending from the said new dock to below Mode Wheel Locks, a distance of about half-a-mile.

The 4th storage ground is on a piece of land adjoining the Warehouses B, and extending past the 30-ton crane on the Salford Quay to the new docks, but this storage is being discontinued, and with this exception none of the timber storage grounds are in proximity or so situated as to be a source of danger, to any of the warehouses or sheds.

The 5th storage ground is on the Salford side of the Canal, in Ordsall Lane, between the Trafford Road Swing Bridge and Chadwick & Taylor's Paper Works.

There are no sawmills, joiners, nor lath-rending shops in any of these storage grounds. Locomotives are allowed thereon for transit purposes, but beyond the risk of these locomotives there is no extraneous nor special hazard attaching to any of these timber-storing places.

This completes our review on the physical hazard of the whole of the risks of the Ship Canal Company's Docks, and we will now briefly refer to the important point of the fire extinguishing arrangements made by the Canal Company to deal with any outbreak of fire that may occur on any part of their extensive premises.

The docks are entirely enclosed by wood fencing and walls, and are under the control of a special police force who are constantly patrolling the warehouses, sheds, and other parts of the dock premises, and they form a Dock Police and Fire Brigade, consisting of 83 men under the command of an able Fire Superintendent and an Inspector, and are constantly drilled, and are subject to the authority of the Chief of the Manchester Brigade. The chief fire station is situate at the main entrance to the docks, with a full equipment of extinguirhing apparatus, and appliances are also kept in the police cabins at each of the other entrances. There are water mains laid down the docks Nos. 6, 7, and 8, and also along the Salford Quay near the quay wall, with hydrants therein about 100 feet apart. In addition to these hydrants, there is a system of hydraulic pipes in the centre of the railway lines nearest to the quay wall on the same docks and quays, with a pressure of water of 750 lbs. to the square inch, and these are so adapted as to form a separate and additional supply to the town's main. There are also 10 ejectors on wheels, which are stationed partly on the quays and partly in the Fire Brigade Station. Each ejector is supplied with 375 feet of hose and can be instantly fitted to the hydraulic pipes for immediate use, and whenever a cotton ship is being discharged in any of the docks there is always an ejector brought alongside and placed in charge of two of the Company's firemen, who are in attendance until the ship is cleared. This hydraulic supply was formerly dependent upon one pumping station, and in a case of a breakdown of the hydraulic engines this supply would have been useless, but there are now two separate pumping stations in daily use, one at Trafford Road and the other at Mode Wheel. Each of these stations is furnished with two separate and independent sets of engines, and as there is always one set of engines working, the hydraulic mains are always in effective working condition. A floating fire engine is to be provided without delay, but in the meantime, a steam fire engine is moored on a pontoon close to the Trafford wharf and can be immediately taken to any outbreak of fire. In addition to this private brigade and its appliances, the Salford Corporation have a fire station in Trafford Road, close to the entrance to the docks, in which a steam fire engine, hose waggon, and chemical fire engine are maintained, together with a brigade. There are 15 "call" stations of the Gamewell Fire Alarm system about the docks, which are thus in direct communication with the Salford and

Manchester Fire Brigade Stations and also the Canal Brigade Station.

In case of fire, the Chief Officer of the Manchester Brigade is empowered to assume command and direct operations.

It will be seen from this brief description of the fire appliances that the Directors of the Ship Canal Company have provided a very efficient means of dealing with any outbreak of fire, as they are most anxious to avoid a fire which would be very disastrous to the Company, and during the eight years that have elapsed since the opening of these docks there have only been a few small fires, which have been put out instantly by the Company's own Brigade, and on no occasion have the Manchester or Salford Fire Brigades had to supplement the work of extinction, though they have always been summoned and have promptly attended.

In addition to the general care exercised to guard against fire, the Fire Offices Committee made a very judicious arrangement some time ago for a quarterly inspection by two Surveyors of several of the Fire Offices *in rota*, who have to report in a specified form on the heating, lighting, fire appliances, and general condition of all the dock sheds and warehouses, and any suggestions made by the Fire Offices Committee for the improvement of the Fire Risk is always carried out, if practicable, and we noticed in the half-yearly report recently issued by the Canal Company an item of "£1376 for sundry alterations to meet the requirements of the Fire Offices Committee, with a further sum of £1200 to which they are committed," and they are also joining the Manchester Corporation in the expense of providing a floating fire engine for additional protection of these premises.

Although much has been done to minimise the fire risk, there still remain some of the elements of danger that exist at all docks, and the use of locomotives about the warehouses is one of the most pronounced, where cotton is handled in large quantities; but locomotives never enter any of the storage warehouses, nor are they allowed to enter the transit sheds, but they are allowed to pass along the lines in the open space in the transit sheds, on the quays, between the docks 6 and 7, and 7 and 8, but will only pass on the running road underneath the floor in the centre of the roadways and not alongside the open side of the sheds. These locomotives are only allowed to burn coke, and the funnels are fitted with spark arrestors, but in all other cases railway trucks are worked by hydraulic capstans instead of by locomotives as formerly.

Another element of danger exists on the Dock Quays from the steam cranes, but the funnels are all now protected by spark arrestors and bonnets, and the ashes from the boilers are removed in an iron box filled with water, so that the risk of "sparks" and "hot ashes" from these steam cranes is minimised. There still remains, however, the risk of sparks from steamers in the docks, and this, taken in conjunction with the wooden sliding door sides to all the storied transit sheds in the dock side thereof, together with the openings through the said doors not being tight fitting (to which we have referred before), does apparently constitute a hazard, but we do not consider it is as great as it appears, because it must be remembered that all these storied transit sheds have concrete floors and concrete ceilings, and sparks would have to fly through the openings in the top of the doors up to the ceiling and then on to the contents before any fire could result, and although these open spaces are objectionable, they cannot be remedied without reconstruction at prohibitive expense; they must therefore be taken as one of the existing risks attached to these buildings.

Although we have expressed a favourable opinion generally as to the management of these docks, and the efficiency of the Brigade arrangements in dealing with any outbreak of fire, yet we wish to speak with no uncertain sound that there are all the elements of a destructive fire in some of these transit sheds, particularly the double sheds on the two quays between Nos. 6 and 7, and Nos. 7 and 8 Docks, owing to the open ends of each shed connecting these four distinct blocks of warehouses, combined with their exposure to the westerly winds, and if once a fire assumed any proportion in any of these sheds, it might take the whole of the buildings on either quay. The Shed Nos. 5 and 6 on the quay between Nos. 6 and 7 Docks was particularly liable to exposure hazard from the open ends and sides of all the storeys before mentioned, but this has now been somewhat remedied by all the upper floors being enclosed in brickwork, but the ground floor is still open to the quay, and is the building most liable to fire from outside causes.

With regard to the Pomona Dock sheds, the risk from fire in these sheds is reduced to a minimum, owing to the nature of the goods passing through these transit sheds, the small quantity of merchandise lying there for any length of time, and the detached position of each shed, all combining to make the physical hazard less than in any other portion of the Canal Company's premises.

In conclusion, we would again draw attention to the excellent management that exists in every department for the object of avoiding fire, and the efficient Fire Brigade arrangements made to meet such a contingency, which ought, in our opinion, to prevent any fire ever developing into a "conflagration."

THOMAS A. BENTLEY.

Insurance Institute of Manchester,
April 7, 1903.

TOBACCO FACTORIES.

When I was requested by your worthy President to write and afterwards read a paper upon Tobacco and its Manufacture, and more particularly to explain the fire risks in connection therewith (for the possible edification of the Bristol Insurance Institute), I must confess that I felt rather dismayed, and the words of the late Lord Beaconsfield's famous epigram, "It is the unexpected that always happens," at once occurred to me; indeed, it was with some diffidence that I accepted the task, thinking that the labour involved in making the numerous surveys, plans, and reports of such a vast number of factories, &c., as are included in the property of the Imperial Tobacco Company was quite enough for one Insurance Surveyor to accomplish. However, I at last, in a weak moment, succumbed, and here I am to do the best I can to put some life (or should I more appropriately say fire?) into rather a dry subject, and make it as interesting and instructive to you as possible. If I dealt specially with the Fire risks of Tobacco Factories (they are as a rule so few) the subject would be exhausted in a very short time, so I shall perforce be obliged to take a broader view and discourse upon matters that affect to some extent all factory buildings; but if you are enabled to gather some fresh information, however slight, I shall consider myself sufficiently rewarded for the composition and writing of a paper of this description in the knowledge that although about tobacco it will not all end in smoke. At the same time, I must remark that for a comparative stranger to stand up in the great tobacco city and hold forth upon its staple industry is, on his part, rather a bold undertaking; but, as personally I have not sought the position, I must ask you to be very lenient towards me, to bear with my technical and other shortcomings, and generally to let me down gently with your criticisms. Situated as I am, surrounded by gentlemen most of whom doubtless belong to the Insurance profession in Bristol, and who are better informed than myself upon the subject in all its bearings, it will, I am sure,

be of no avail to romance or draw upon my imagination, but to state as far as within me lies unadorned facts, gathered by patient research and personal observation, as to Tobacco, its Manufacture, and attendant Fire risks, for it is facts only that appeal to business men. It has often occurred to me that the younger generation of Insurance men have much greater advantages in gaining advanced knowledge than we of an older generation possessed: the only consolation we have is knowing that we have acquired, or ought to have acquired, the greater experience which only comes with years, and thus I suppose the law of compensation and the balance between us is adjusted. Still, in these go-ahead times, even experience may come to you in much quicker time than it has to us of the old *régime.* You have to thank the present hustling, bustling times for it; these will probably increase as we become more Americanised, but for my part, I have more faith in the steady, solid conservative method of procedure as being more profitable and best in the long run. The new style of pushing business, on account of increased competition in the commercial world, must greatly add to all known Fire risks, and, as a consequence, to Fire losses. We must, I suppose, follow or be left behind in the race. I am, I fear, straying into bypaths of speculation, and you will, as good business men, think that what I have been saying is hardly relevant to the main subject, although to a certain extent it has a bearing upon the moral risk, which, after all, is the principle upon which all physical risk can be estimated. Here in Bristol, and also in the other large provincial cities, you have a great advantage over your London *confrères* by having your Institutes where valuable scientific and technical papers are read and discussed, and ideas exchanged upon all branches of Insurance matters; in this respect it is a pity that the Metropolis has not yet seen the way to follow your lead.

You must be wondering, gentlemen, when this long-winded preamble is coming to a close and the real subject of the paper brought more prominently forward. I will now reward your patience, and be as brief as the time allotted to me will allow.

It is stated that the cultivation and use of tobacco are of such antiquity that authentic history does not record their beginnings. In November, 1492, two sailors sent by Columbus into the interior of Cuba returned with accounts of having seen the natives carrying firebrands and exhaling smoke from their mouths and nostrils. Investigation revealed that the firebrands were

made from the leaves of tobacco, rolled and burned in a sheath of Indian corn, and that the smoke was inhaled for sensations of pleasure and exhilaration. The instrument used for inhaling the smoke was made from hollow cane, forked in the shape of the letter Y, the small ends being inserted in the nostrils and the large end applied to the burning leaves. The habit of snuff-taking among the natives was described first by Roman Pane, a Franciscan, who accompanied Columbus on his second voyage, and the practice of tobacco chewing was first observed by Spaniards on the coast of South America in 1502. Tobacco was consumed in one form or another by the aborigines from Canada to Patagonia, and, especially in the form of smoking, its use was an immemorial custom.

Tobacco, as far as I can ascertain, appears to have been first introduced into Europe in 1558 by Francisco Fernandez, and from him Jean Nicot, French Ambassador to Portugal, sent some to Catherine de Medici; he also introduced it to his own country, where its use in the form of snuff began in the reign of Francis II. About the same time a snuff factory was established in Seville, and there the celebrated Spanish snuff was produced. It was from this Nicot that the name of nicotiana for tobacco was derived. In Queen Elizabeth's reign the poet Spenser thought so highly of the plant that he called it "Divine Tobacco," as it was supposed to possess the most miraculous healing powers. It was Ralph Ham, the first Governor of Virginia, and Sir Francis Drake who brought with them from Virginia in 1586 the implements and materials for smoking, which they handed over to Sir Walter Raleigh, who introduced them to this country, and so extraordinary was the practice of smoking considered that it is related that when the adventurous knight's manservant saw his master smoking at his ease, thinking him to be on fire, at once endeavoured to extinguish the same by emptying the contents of a bucket of water over him. However, it was not until the 17th century that smoking became popular, when it spread with great rapidity, in spite of the opposition of statesmen and priests, and even of James I. himself, the latter being particularly bitter against it, as one may judge from the narrow-minded style of his famous "Counterblast." Gradually, from this period, it has gone on increasing by leaps and bounds until one might suppose it has reached a record in the beginning of this 20th century, as far as the quantity consumed per head of the population is concerned.

There are many species of tobacco, but the most important is the Virginian tobacco (*Nicotiana Tobacum*), a native of the warm parts of America. The plant is herbaceous, grows to a height of five or six feet, having large broad leaves terminating in a point, depending from straight upright stalks. Its cultivation requires a rich, loose soil, strongly manured, and a dry tropical climate. Vegetable manures are preferable for growing smoking tobacco, and animal manure when it is required for snuff. Tobacco is also grown in the East Indies, Cuba, Persia, Greece, Java, Surinam, Borneo, Turkey, and Germany, but prohibitory laws prevent its cultivation in the United Kingdom. In Virginia the seeds are sown in rich soil in the month of January, and the plants transplanted on hillocks in June following. Much care and attention is then required in weeding and in preventing the ravages of insects, and flocks of turkeys are kept by the planters to keep this pest from destroying the leaves. When the plants are not intended for seed the tops or flowering portions are broken off, so that the whole strength may be directed to the leaves; and as soon as the latter become yellow, or marked with yellow blotches, the time has arrived to cut down the plants, a process done by hand only. The best time for cutting is at mid-day, when the sun is most powerful and dews are absent.

The leaves are then removed to the drying-sheds or curing-houses, where they are suspended from sticks to be air-dried. The process of slow fermentation takes about two months, but when artificial heat up to 170° F. is used, the process is completed in four or five days. It stands to reason that the natural air-drying method should produce the best tobacco rather than the forcing system. The leaves are next separated from the stalks, the former being carefully packed by means of great pressure into hogsheads. The leaf tobacco is now ready for importation, and upon its arrival in this country is placed in bonded warehouses, the principal being at the various Liverpool docks. The finest of these warehouses is the new block at the Stanley Docks, having in one range 72 distinct fire-proof compartments for storing tobacco alone. These compartments are of the most approved construction throughout, the communications with each other being by fire-proof passages nine feet in length, protected by wrought iron doors at each end. They are lighted by incandescent electric lamps, and are fitted with every appliance for extinguishing fire, in connection with several independent supplies

of water. These warehouses are quite up to date in every respect, and far surpassing any I have inspected elsewhere, excepting only the new warehouses of the Entrepôt Royal at Antwerp. In all the bonded warehouses the tobacco is released from the hogsheads, weighed, and replaced therein. The weights and other particulars are then marked outside the hogsheads, sampling being permitted in warehouse by special dock permits. These 72 compartments alone when full hold 120,000 hogsheads, valued at £30 per hogshead, or a total of £3,600,000. In the Victoria Docks, in the Port of London, I estimate the value at £2,000,000.

The chemical analysis of tobacco produces nicotine (a liquid volatile alkaloid), empyreumatic oil, albumen, gum, resin fats, several acids, such as ascetic, oxalic, malic, carbonic, pectic, and nitric, also potash, lime, silica, sugar, and ammonia.

From describing thus briefly the history and structure of the cultivated weed, I will pass to its manufacture and uses as follows:—

The manufacture of tobacco for ordinary smoking and chewing purposes, and for cigars, cigarettes, and snuff, as far as concerns us, may be briefly described as follows:—The leaves when taken from the hogsheads and packages are sometimes opened out in steam-heated troughs, and afterwards sorted, according to quality and requirements, by experienced hands, and except for making "Birdseye" (when the whole leaf is cut up) the stalks are stripped from the leaves. The latter then are liquored, or sprinkled over with pure water, applied by a bunch of dried evergreens or by means of a sprinkling cylinder. While still moist and pliant, the leaf to be made into cavendish cake or plug is placed under pressure in moulding machines and from thence goes to hydraulic presses, where the mass is submitted to the enormous pressure of three tons to the square inch. The presses are heated by steam up to 200° F. in order to darken the tobacco by artificial fermentation a kind of sweating process for spreading the juice throughout and generally improving the taste or flavour. The old-fashioned method for darkening, still performed at some factories, is done by placing the cake in stout wooden-clamped boxes, and putting the latter into baking or drying stoves exposed to a very high temperature, often exceeding that in the presses. The heat is generated either by direct steam, by flues under floors, from furnaces fired outside, or from coakles technically called "devils." When cake or flake tobacco is required only cold presses are necessary.

After pressing, the tobacco is cut into shreds by cutting machines driven by steam, gas, or electro-motor power. Sometimes, for the finer class of cigarettes, it is cut by hand. The cut or shredded tobacco is next placed in open metal drying pans cased with wood at sides only, and heated by steam or gas jets underneath. The contents of pans are tossed about by hand, so as to produce evaporation of excessive moisture, and at same time a curling of the shreds. The tobacco is then spread upon canvas cooling trays and made ready for the stock tubs and bins previous to mixing and packing for sale. The cavendish for export is produced in altogether a different way, various ingredients being added to the leaf, such as liquorice, saltpetre, sugar, and rum, all being steeped together in hot water, and afterwards placed under hydraulic pressure, and stoved at great heat as described.

The roll or twist tobacco, commonly called "pigtail," is made by twisting the leaves together in spinning machines regulated by hand, but driven by power. A small quantity of olive oil is used during this process, after the twist or rope is formed, for smearing the surface with the oil, so as to prevent the layers from adhering one to the other. The spun tobacco is then made into coils by machinery, and corded around outside to keep them in place, afterwards being subjected to steam-heated hydraulic presses or baking stoves (as in the case of cake tobacco) for 24 hours. The black juice (not unmixed with small proportion of olive oil) which is expressed, is economised and boiled down with tobacco sweepings waste, for sheep and cattle wash. The tobacco generally in use amongst sailors is made by tying up leaves into torpedo-shaped bundles or cones, and is technically called "carottes." Tobacco leaf varies considerably, rendering mixture of the different kinds a most delicate and important task in the manufacture. Some leaves are of a strong, rough character; others are mild, fine, and of excellent flavour, but devoid of strength. Nicotine determines the last quality, but not its flavour or aroma. The latter increases with the age of the plant. The nicotine may be modified by style of growing. The plants, like wine crops, vary in richness and delicacy of flavour with the seasons, and by blending, the numerous desirable mixtures to meet all tastes are arrived at.

Snuff is produced from the separated stalks, which are first highly dried in a large open metal tray, placed in a sloping position immediately in front of a large coke fire burning in an

open grate or furnace. When sufficiently dry and cool the stalks are pulverised by revolving knives in mills, or more often by grinding under stones. The powdered stalks are then further advanced as snuff by reduction in pestle mills, or by means of stamping machinery. Previous to grinding it is very important that all foreign substances be separated from the stalks, and this is performed by a magnetic machine which draws all nails and bits of metal away, a very necessary precaution, both on account of risk from fire, and for preservation of machinery. Disintegrators are used for grinding the various tobacco sweepings from floors. This waste is known as "offal" which, in conjunction with the twist refuse liquor, as already mentioned, is made into cattle wash. When this waste tobacco is very great it is gathered together and given back to Customs to be destroyed, and the duty paid is returned. In some bonded tobacco warehouses there is a large brick and iron enclosed furnace for periodically burning the collected sweepings from warehouse floors. The brick flues are very large, and very little danger from fire need be apprehended therefrom. The lengthy processes of curing snuff follows the admixture of aromatic substances, salts, etc., with the ground stalks. Frequent fermentations or natural heatings are necessary to effectually destroy the nicotine and also the numerous acids found in tobacco, but the alkalines are allowed to remain. The best cigars produced in the United Kingdom are made from the finest and most delicately flavoured leaves from the island of Cuba, and consist of a core or fillings enveloped in an inner and an outer cover, the latter being generally made from the finest Havana leaf. The cigars are, when finished, sorted, bundled, and put into boxes. The latter are then placed on racks in cupboards to dry at a temperature not exceeding 80° F. arising from gas jets or stoves, with iron shields above gas stoves, or from low pressure hot water, or waste steam pipes. When properly arranged, none of those methods for drying are dangerous. Cigarettes are now made to an enormous extent in this country, both by hand and by machinery. They consist of small rolls of finely-cut tobacco, wrapped in a covering of thin tough paper specially made for the purpose. The cut tobacco is placed in an open hopper attached to the machine, from whence it moves down an open groove and is shifted on to the continuous band of paper. It is then enfolded, fixed, and finally cut into required lengths, issuing from the machine as finished cigarettes at the rate of 500

per minute. The only drying process required to set the cigarettes is done by a gentle heat from 65° to 70° F., or they are kept in a dry room for 48 hours, which prevents waste in packing. The packages for both cut tobaccos and for cigarettes are principally made by machinery but in some factories soldering of tins and lead paper is still done, also the making of packing cases and cardboard boxes carried on. The former necessitates the introduction of sawmill machinery, and carpenter's benches or stools. The drying of timber is likewise carried on, thus endangering the tobacco factory proper with all the well-known hazards, such as spontaneous ignition from greasy and damp sawdust, accumulation of chips and shavings, and overheating of machine bearings and drying rooms. This is greatly to be deprecated, and where possible the wood-working should be carried on in a detached building, or if that is not practicable, in a separate fireproof compartment, the opening into the main building being protected by iron doors. And now, passing from the rather dry details about tobacco and its manufacture, I will proceed to that portion of my paper which I think will interest you most, namely the fire hazards which may from time to time arise. As far as I can ascertain or remember, very few fires of any consequence have taken place in tobacco factories, hence we may reckon them as desirable insurances, and profitable at moderate rates, especially where tobacco is only cut and cigars and cigarettes made. The extra or special risks are undoubtedly from drying or baking stoves, packing case and cardboard box making, timber drying, and snuff making; otherwise, I think there is but little more than ordinary hazard to be apprehended. There are, of course, the ordinary dangers common to all extensive factories and warehouses, such as defective construction, extraordinary height, careless arrangement of artificial lighting and heating, accumulations of waste (greasy or otherwise), dust, dirt, and rubbish of every description, and last, but not least, the moral risk of loose or easy going management. When the latter is strict, but not necessarily severe, the physical risks are, as a rule, minimised by organised and efficient supervision.

In construction, when a building is wholly or even partly built of timber or laths and plaster, brick noggin (that is a framework of timber with bricks in the spaces between), with tarred felt or corrugated iron roofs, it must be regarded as adding fuel to a fire. Where exposed iron columns and girders exist in an otherwise

brick or stone building, it follows that the combustion is much more rapid and the destruction more complete than when a building is constructed of fire and water resisting materials. The action of iron when heated to incandescence and suddenly deluged with tons of water is well known. The expansion from heat and contraction from the application of water splits, twists, and contorts the iron. It writhes as if it were in agony, and brings the whole structure to the ground from failure of its supports; whereas stout wooden girders and posts would remain in position and thus keep the walls intact and upright, and on inspection after the fire it would possibly be found that these wooden supports were only charred externally to a depth of possibly half an inch; in fact I have known instances where these wooden supports have been used again when the building was reconstructed. A floor made of 9-inch wooden joists all close together is good construction. Iron has its advantages over wood in construction for carrying weight, but when used it should always be protected, even to the light principals and framing of roofs, by fibrous plaster or other non-conducting fireproof materials, held together by wire or expanding steel. Cement should not be used, as it is very liable to crack and fall away when subjected to heat I have even seen ordinary earthen drain pipes encircling iron columns for the purpose of protection, concrete filling the space between, and no doubt they would prove effective, although in appearance clumsy. No appreciable amount of heat will penetrate to the iron if the fireproof resistance is an inch in thickness, and three-quarters of an inch has been thought sufficient by the Tariff Committee. Coke breeze concrete if made from actual crushed coke and lime will readily burn, but if made from furnace slag instead of coke it makes excellent fireproof material for floors and as a substitute for stone in staircases. Although cement cracks from heat it is impervious to water, but the same cannot be said of lime-mixed concrete, which drains the water through. It is generally supposed that brickwork jointed together with cement is fireproof on account of its extreme hardness, but I remember a case where brick arched vaults constructed in this manner gave way at the joints, and the structure fell bodily. Had they been built with mortar, or better still (as in kilns for firing earthenware) with plastic clay joints, they would have stood. Whole walls have had to be rebuilt after a fire in consequence of the cement joints perishing. Stonework is a bad substitute for brick-

work, particularly limestone, as the heat from fire causes the carbonic acid in the stone to evaporate, which consequently shrinks and crumbles under such circumstances. Iron doors between two stone buildings completely drop out, and stairs built of this material naturally give way when subjected to fire. Sandstone is preferable, but is not used on account of its liability to disintegration from frost. I do not think any construction, from a Fire Insurance point of view, equal to brick. Corrugated iron is most unreliable, for as soon as the iron rivets which join the plates together become heated from the fire (unless they were previously made red hot when used) they shrink on the application of water, tumble out, and the sheets released fall like a pack of cards.

In order to separate buildings completely, the brick party walls should be carried three feet above the roof, and where openings in wall are required they should be made secure by fireproof passages having Tariff regulation iron door at each end. Settlements in walls, owing to sunk foundations, should be noted, more particularly when iron doors have been inserted therein, for although the ground has shrunk, the doors will frequently remain in position and show a wide gap between their lower part and the floor. I have observed as much as six inches in some cases in a warehouse where numerous doors were involved. In the event of fire this would be very disastrous to goods easily damaged by smoke. Wood linings, especially to walls and unenclosed hoists, are always a great assistance in making a fire, once started, spread rapidly and burn merrily, the air space at the back of matchboarding causing rapid combustion. Hollow spaces are always bad, on account of possible accumulation of rubbish and inflammable vapour therein. There is a newly patented fire resisting material called "Uralite," made from asbestos, flint, and chalk blended together, and made into sheets by machines resembling those by which paper is produced. This material, nailed against walls, fixed to a wood framing or to ceiling joists and rafters of roofs, will readily stay the progress of a fire. Partition walls are now made fireproof by an excellent device of plastering dovetailed iron on each side. Ceilings can be treated in the same way, or expanded steel covered with fibrous plaster can be used in like manner. The whole of a light shed or one-storey building can be constructed of either of these three fireproof materials, even the covering of roofs can be accomplished by Uralite slates. The

small extra cost greatly minimises the Fire risk, and consequently Fire premiums, with benefit to the public. It is for the public to adopt the fireproofing system. The Offices will, of course, take care of themselves in adjusting premiums to risks, so as at least to leave a margin for reasonable profit.

Previous to building new works, it is always advisable to have the plans submitted to the Fire Office, or in any case the architect should consult the Office Surveyor as to the requirements of the Insurance Company as to cutting off risks; thereby the cost of insurance might be reduced by limiting the fire hazard and rendering the spreading of conflagration from one portion of the works to another a remote contingency. In London this is now being adopted with satisfactory results, and after fires I have frequently heard the Assured say, "I am glad I followed the advice of the Office, otherwise the loss would have been much heavier," and so there comes a grain of satisfaction even in adversity. Unenclosed hoists and lifts are often built for convenience in the centre of a building, thus acting as air shafts and rapidly causing a fire to spread from floor to floor, from basement to roof. These should be constructed of brick, and for preference outside the main walls, but the openings from hoists to each floor should always be protected by iron doors or revolving steel shutters. The latter give great resistance to fire on account of the surface being broken up by an undulated or corrugated surface; each lath forms an individual resistance and a strength in itself. Hoists should always be kept free from waste and rubbish accumulations at the bottom, for a lighted match, accidentally dropt down from an upper floor into loose paper and rubbish below, will quickly raise a flame which might readily be drawn into a building, and although this may occur during working hours, it is a difficult fire to overcome.

At the present time we have nothing to equal the Tariff regulation iron doors—I have seen experiments at 2000° F.—upon other so-called fire-resisting doors, but none have come up to expectations, except, perhaps, revolving steel doors and shutters, for reasons already given. Solid teak or oak doors, say 2 inches to 2½ inches in thickness, in my opinion, come next, but they must be very carefully fitted. Windows at right angles, overlooking skylights, or opposed to other windows, can be protected in various ways, such as by iron or steel shutters, revolving or made folding and bolted as doors, or by iron hopper shutters

fixed at an angle, open at top, with iron cheek on each side. These are always in position, and may be enamelled or painted white on inner surface for reflecting daylight, and when necessary can be drawn in to cover window by means of a chain fixed inside. Fire-proof glazing is now common, and has given excellent results after severe tests at the Fire Prevention Committee's premises, an excellent institution for testing construction materials. The "Luxfer" window prisms in copper electro-glazed squares, 4 inches by 4 inches, and wire-glazed sheets, have both been highly recommended for their fire-resisting qualities, but for preference I should select the former. Kiln wire placed over windows outside will also prevent fire from penetrating a building, as it breaks up a sheet of flame and reduces its power for mischief. All these methods for protection against outside hazards are very important when we remember that flames will at times reach across a street 40 feet in width. The various electric cables constructed of most inflammable materials are now a source of danger, as they are liable to ignite at a fire and drop in a burning mass against wooden window frames and doors of buildings at a considerable distance from the original seat of a conflagration, and may certainly be reckoned as an exposure hazard. Window frames are better when made of iron, or of such hard woods as teak and and oak. Cupboards under stairs are often receptacles for lumber and waste, and in such a position should be avoided, especially in factories.

The height of buildings must be taken into consideration, as pressure of water in case of fire may not be sufficient to reach the top storey. The jet from a branch is estimated to be only effective at two-thirds of its height, the remaining one-third being mere spray, hence the superiority, from an Insurance point of view, of one storey or shed buildings, where a fire may be more readily extinguished.

The methods of artificial lighting are most important. Electric lamps are preferable where the installation has been carried throughout by responsible engineers, in accordance with Fire Office Rules, and passed after close examination by the Insurance expert, whose duty it is to see that all dynamos, conductors, switch boards, resistance coils, cut-outs, and fuse boxes are made of the proper materials, and so arranged and placed that all danger from short circuiting or electric arcs may be avoided. Wherever there is danger of short circuiting

from wet or damp, the insulated conductors should pass through new iron tubes or conduits lined with bitumen or other damp proof composition. In lighting gas, an electric lighter or enclosed lantern with whole in glass at bottom should be used, and all brackets should be fixed, and not liable to swing against, or be placed under wooden shelves or ceilings. The remedy in the way of safety stops for such is a simple matter—a wood block placed in the angle next wall and arm of bracket—or where double-jointed an iron bar can be inserted across the iron barrel; ingenuity can generally devise a method to prevent contact. All gas pipes should be iron, as lead pipes are liable to break or become pierced by teeth of vermin, causing escape of gas, and often subsequent explosion. An iron, talc, or mica shade fixed to arm of bracket above burner is very useful, as whenever the bracket moves the shade follows and protects. I do not advocate wire globes as a thorough safeguard, for hot carbon from the gas combustion will accumulate upon rough wires of globe and may drop off in red hot state into a heap of combustible matter under, such as shavings, wood-wool, or on to greasy floor or bench. Unless such globes are fixed firmly by metal disc screwed tightly around nipple, they fall on one side and considerably increase the tendency to gather carbon. The Lord Chancellor and sundry municipal bodies and County Councils are most particular that all gas lights shall be protected by wire globes in theatres, but to my mind the remedy is far worse than the disease. Mineral oil lamps, unless specially constructed and carefully placed, are a great source of danger from explosion or from upsetting, but such lamps are hardly likely to be used in tobacco factories. Acetylene gas, provided the generating plant is away from buildings, may be used without greater danger than ordinary coal gas.

The mode of heating must next be considered—ordinary fire-grates, electric heaters, gas stoves, low pressure hot water, or exhaust steam pipes, are all more or less approved of as free from extra hazard; hot air may also be recommended, if properly arranged and looked after. There is also a system of semi-high pressure pipes, emanating from Belfast, which is tolerably safe; but high pressure hot water systems, direct steam pipes, and pipe stoves always give rise to reasonable uneasiness in the Insurance mind. The free working of the high pressure systems of water and direct steam is very doubtful. They have been known to

make woodwork so dry as to be ignitible even without the medium of actual fire; no woodwork in these systems should be nearer than three inches, and for absolute security no pipe stove or iron flue should be nearer than six inches. When woodwork is protected by such a heat conductor as sheet iron, an air space of one inch should exist between wood and sheet iron. Uralite or fibrous plaster lining is far superior as a protection.

Drying stoves or tobacco baking stoves must always be more or less hazardous, by whatever means they are heated. The open coakle looks formidable, but perhaps it is less so than flues from furnaces fixed outside a drying stove, for unless the flues are put together with fireclay (as in kilns) they are after long usage very liable to crack at the joints or give way, so that flames come through and burn all that is combustible in the stove. Direct steam, or high pressure hot water pipes, will so dessicate any woodwork in the construction or fittings, that it becomes as porous as tinder, and even a spark lodging there will cause smouldering and finally an outbreak of fire. It has always been regarded as a mystery how fires can occur in drying stoves where only steam or hot water pipes or hot air is used, but perhaps chemical changes take place, not yet understood, which may account for this. When we remember (and it is a scientific fact) that the wood is in a state of activity, and that all the resisting sap has long since evaporated, we cannot be surprised that molecular friction takes place (somewhat like the rubbing of two pieces of dry wood together to produce fire) such as might cause an outbreak of spontaneous ignition.

I give you this theory of mine for what it is worth; in the future some of our younger friends may be able to elicit the exact truth as to the cause of these drying stove fires. In any case where the temperature in stoves exceeds 100° F. I should recommend fireproof construction only; the heat in tobacco baking stoves I have found exceeds 200° F. Darkness rather than light seems to favour ignition, and another supposed cause of fire has been assigned to dampness, or water finding its way into wood dried to a state of charcoal, thus producing what is known as spontaneous ignition. Floors where olive oil is extensively used in making twist, should be scrubbed once a week for obvious reasons. The workmen's tobacco pipes should be deposited in racks, under care of gatekeeper previous to their entering the works, otherwise, as it often happens, the pipes are

placed, still alight, in pockets of coats taken off and hung up in wooden-lined lobbies. Such carelessness has frequently caused fire.

The large open fires for drying stalks for snuff require extra precautions,, and no combustible materials or fittings should be near. When stalk grinding is done danger may arise from foreign substances such as nails, matches, or earthy grit getting mixed with stalks and striking fire between the stones. I have detailed what might happen; certainly the element of chance has been most favourable at tobacco factories, and I trust will long continue; indeed the risks are almost normal where good management prevails. In every insurance transaction most attention should be paid to the moral element, for that rules the whole risk to an enormous extent, but with ceaseless care physical risk is reduced to a minimum. Arson in the cases under consideration is most improbable, but incendiarism from spite, temper, fancied grievances of ill-conditioned employees, or mania, is always a contingency to be reckoned with in estimating the fire hazard. The latter cause—mania—where large numbers of persons are engaged, cannot be thoroughly gauged, for the complexity and depth of the human mind will always present a puzzle. Cases of a burning desire (no pun intended) to create a blaze are not unknown, and without reason the one pet idea of a certain type of maniac is to destroy by fire. I can only repeat that considerate and careful management is the best prevention of both abnormal moral and physical risks.

Before concluding I think I should say a few words about fire extinguishing appliances. Sprinklers properly installed have extinguished many fires at their outbreak, but unless the whole apparatus is constantly inspected they might prove to be a doubtful benefit by going off when not required to do so (at the expense of the Assured), or they might not act when most needed. Hydrants, hose, and branches (inside buildings) should always be attached to each other, otherwise much valuable time is lost by nervous persons in their endeavour to couple or screw the various pieces together, and this is not to be wondered at in amateur firemen or employees, considering the amount of dense, pungent smoke which arises from tobacco, and which always greatly embarrasses and impedes the action of experienced firemen. With regard to smoke, it should always be remembered that as it rises it leaves a breathing space from the ground, for two feet upwards, so that with a wet flannel tied around the mouth and

nostrils one can creep about below the smoke and thus reach the actual seat of the fire, a most important proceeding when your object is to extinguish it quickly.

Hydrants and standpipes outside and around buildings are more likely to be efficient than those inside, being worked with greater ease and confidence by employees and volunteer firemen. Fire buckets filled with water are the best fire extinguishers during an outbreak in the daytime, for these, dashed right upon the actual fire, prove as a rule to be most effective; at least this was the late Mr. Braidwood's opinion, and he had a perfect genius for extinguishing fires and reducing their proportions. A few buckets filled with sand often come in very useful, especially when volatile spirit or greasy matter is involved, water having in such cases very little effect. Extincteurs take too much time to manipulate. Hand grenades and the like are better, if applied immediately, but hand pumps are almost as useful as fire buckets. Of course, these remarks refer only to appliances which can grapple with a fire at its commencement. When control is lost the only remaining hope is vested in regular firemen and steam fire-engines, but if possible it is better to do without their assistance. I think the time has arrived when I should put in a word in favour of tobacco, and bear witness that but for the consumption of a considerable quantity through the medium of a pipe, in combination with a gallon or two of midnight oil, this paper could never have been produced. Personally, I am a great advocate for smoking in moderation. Nature always punishes the abuse, and the sensible man will soon find out what is the right quantity for his particular need. It is a grand restorative for the exhausted brain and sensitive nerves, will always soothe and reduce the magnitude of worries. Under its influence thoughts are concentrated and decisions arrived at, and it is a panacea for most of the ills that flesh is heir to. A law, however, should be made and enforced prohibiting its use amongst the male population before a certain age, otherwise it will be a bad lookout for the future of this vast Empire when calls are made upon its mental and physical strength, dwarfed and injured by the too early indulgence in tobacco.

O. R. FABIAN.

Bristol Insurance Institute,
February 27, 1903.

INSURANCE OF CUSTOMERS' GOODS.

THE subject of this paper was suggested to me by some recent experiences of Offices in this district, and, as some fresh points emerged while claims were being adjusted, it occurred to me that a useful service might be rendered if the various points which arose were put on record before a Society such as this, together with a short statement of the principles involved and of the practice prevailing generally, in relation to the insurance of customers' goods.

There will be no pretence in the paper of exhausting the subject, the intention being rather to indicate some of the more important questions which arise in relation to the subject; and one may point a moral, if he cannot adorn a tale.

Probably one of the first sets of words a novice in Insurance gets off by heart is the one which reads:—"On stock-in-trade the property of the insured or held by him in trust or on commission for which he is responsible," and in a general way the novice will be given to understand, or come to believe, that these words give full protection to an insurer for not merely his own stock-in-trade, but for a customer's stock as well. The words are not as simple as they look, however, but fruitful with various knotty problems. Knots are often to be found in wood, but let us hope that the treatment of this subject on the present occasion will not be wooden.

So as to clear the ground, let me say that I propose to consider these words as they affect at least three classes of goods.

(1) Goods dealt with in ordinary transactions of buying and selling.

(2) Goods temporarily in custody of some tradesman for repair.

(3) (and possibly this is only a variation of the second class, but as it presents some special features, it may be considered separately)—Goods lying at laundries and similar places.

Let me explain further, before we proceed to consider the question of the liability of the buyer and seller in regard to risk of loss by fire, that I have mostly selected the illustrations of the first part of the subject from what is rather pretentiously called *the* trade, not from any impish or frivolous reason, but because the trade furnishes probably more *nice* questions on the subject (to use a colloquialism) than any other, and because in reference to it, (possibly arising out of these *nice* questions,) practice has in some measure become better defined.

One of the laws regulating transactions in buying and selling is the Sale of Goods Act 1893 (Section 18, Rule 1), which provides among other things that "where there is an unconditional contract for the sale of specific goods"—*specific goods* being afterwards defined as "goods identified and agreed upon at the time a contract sale is made" (Section 62)—"in a deliverable state, the property in the goods passes to the buyer when the contract is made; and it is immaterial whether the time of payment or the time of delivery, or both, be postponed." And again (Section 20) —"When the property is transferred to the buyer, the goods are at the buyer's risk, whether delivery has been made or not."

Risk, of course, is what an Insurance Company is concerned about, and the law which we have quoted makes it clear that whisky (for example) sold by a distiller to a merchant is at the merchant's risk, though lying in the distiller's bond; and similarly whisky sold by a merchant to a shopkeeper or publican is at the shopkeeper's or publican's risk, though lying in the merchant's or distiller's bond, and, though this is rather a *reductio ad absurdum* of the whole matter, when the individual has purchased one or more bottles of whisky, these lie at his risk on the shopkeeper's or publican's premises, if identifiable.

The buyer, however, might easily forget to protect his risk, and the risk can be covered more conveniently by the seller, so long as the goods lie on his premises; so there is a provision of the Sale of Goods Act already referred to, to the effect that "where any right, duty, or liability would arise under a contract of sale by implication of law it may be negatived or varied by express agreement or by the course of dealing between the parties or by usage, if the usage be such as to bind both parties to the contract" (Section 55).

Taking advantage of this provision, a distiller (and a similar practice is spreading in other trades also) usually introduces into

his invoice a clause to the effect that "the goods while lying in bond with him are insured under his insurance policies against loss by fire for behoof of owner to the amount payable under the original invoice." But even if there was no such clause the distiller or merchant (wholesale or retail) would, if the circumstances were favourable for himself, owing to there being a margin of insurance, probably claim that, according to the custom of the trade, his customers' goods were covered by his policy, and if the custom of the trade was uncertain the claim would probably be made all the same in such circumstances.

In passing I might remark that the words "for behoof of owner" have been considered by counsel as being of somewhat doubtful interpretation where the whisky has been sold more than once. There is no doubt of their protection to A, who first buys from the distiller; but if A sells to B, and B sells to C, counsel are not of one mind as to whether the protection of the distiller's invoice extends to B and C, and in such circumstances it would be presumptuous for a layman to attempt to decide the exact legal position. On the other hand, one might without boasting plead that most Offices would in such a case, apart from the strictly legal position, act with equity.

A case came to the front in the West a short time ago where a firm of merchants had altered their own practice or custom. Formerly they had been in the habit of covering their customers' goods by such a clause as the one I have quoted, but recently this practice or custom of theirs had been changed, and in respect of certain customers the invoices to these customers were stamped—"Fire insurance is left to your care." A fire occurred at their bond, and it was discovered that some invoices for these customers had not been marked with this new clause—"Fire insurance is left to your care"—so the firm referred to made a claim on the companies insuring them, for the goods to which these invoices referred, on the ground that their customers having no information to the contrary, would naturally conclude that the goods were covered, and the Offices after considerable demur agreed to make an *ex gratia* payment towards the claim. This payment was also in respect of some customers' goods where the invoice bore the clause "Fire insurance is left to your care"—but it was contended that the customers had apparently overlooked the clause and believed the goods were covered in the same way as they had been covered by the bonded storekeeper with whom the customers

had previously dealt, or that the insured were custodiers for their customers' goods, and liable as such.

One or two other interesting points also occurred in connection with this loss. Certain goods belonging to customers had been sold, *to be delivered in England*, and it was held that, as something was still required to be done to them, the risk had not passed to the purchaser. Other goods had not been paid for, and it was held that in these the seller had an insurable interest to the extent of his lien on the goods, that is, to the extent of his right to retain them for the price while in possession of them.

In the event of a payment in such a case, the Office could require the insured to assign his claim against the buyer to them, so as to put them "in the same position for recovering the price as the seller had in virtue of his contract of sale." But the cases must be rare where an Office would care to exercise this right.

Another case has come before me where a merchant has had printed on his invoice, "No liability." At the same time he has gone to his Insurance Company and prevailed on them to admit that his policy covers his customers' goods as well as his own.

We shall not at present stay to consider the effect of these practices, as that can be done better when we come to deal with the question more generally. In the meantime, I am concerned simply to state the practices, and the law regarding liability, and pass on to another set of words familiar to the novice in Insurance, and which defines the limit of the insurance, these words being—" On stock-in-trade the property of the insured or held by him in trust or on commission for which he is responsible, in no case exceeding the market value of the same immediately anterior to the fire." It seems scarcely necessary to state that market value is a varying and increasing quantity, according as it means (for example) the value at which the distiller can put the goods on the market—that is, cost price (not reckoning profit) which would be the basis of any settlement for his own goods—or the value at which the wholesale merchant buys, which to him is cost price, but includes the distiller's profit—or the value at which the retail merchant buys, which to him is cost price, but includes both distiller's and wholesale merchant's profit, and so on. You will pardon the fulness of the statement when I tell you I have seen it argued that a claim for customer's goods which was being

adjusted *ex gratia* should be settled on the basis of first cost price. Otherwise, it was contended, the merchant would be securing a double profit, which, of course, he was quite entitled to, since in respect of the claim for the customer's goods he was simply an intermediary, and the indemnity was not to him but to his customer, and if he supplied the goods twice to the customer he was entitled to a double profit.

Apprehension of a fact is sometimes only commensurate with the extravagance of its statement.

But in practice there is a limit to this indemnity to the customer. The invoice from which we already quoted states that "while lying in bond with the distiller the goods are insured under his insurance policies against loss by fire for behoof of owner to the amount payable under the original invoice."

As whisky is an article which increases in value with age, then any difference between the invoice price and the actual market value at the time of the fire is a liability attaching to the customer himself, and against which he would require to provide his own insurance.

In a notable case in this district it was held that where there was only partial damage, the insured could only recover for behoof of the customer on the basis of the original invoices, even though the actual loss, including damage to enhanced values, was within the amount of the invoices.

In another case, however, Offices, after taking legal advice, found it necessary or desirable to admit a claim even in respect of enhanced value also. But in this latter case the liability of their insured was one, in legal dialect, from *fault* and not from *contract*. The goods had originally been in bond at a distillery, and while the bond was being enlarged they were removed to Glasgow and stored there without either the knowledge or the consent of the customer.

By agreement, however, between parties, even the enhanced value of a customer's goods can be covered under the seller's policy.

Thus far I have endeavoured to set forth the law as to risk of loss by fire in respect of buyer and seller, and have cited various examples of the practices under it in the whisky trade. In some cases, as we have seen, these practices are, if one may use the phrase, outside the law. Before we pass away from this part of the subject, it might be of interest to cite Rule 8 of the Scottish Provision Trade Association, which in some respect anticipated

the provision of the Sale of Goods Act already quoted. The rule reads as follows:—

Risk of loss by fire shall be—

With the seller in sales *ex* store for *fourteen* days from the date of delivery order, whether or not the price is paid, the delivery order lodged, or the goods weighed over and/or transferred (provided only the goods remain in store).

With the seller in sales *ex* store of goods forming part of a larger parcel for such longer time beyond said *fourteen* days as the goods remain untransferred to the buyer; but seller shall have right to charge buyer for taking such risk after said fourteen days.

With the seller in sales *ex* store when, by letter, he agrees to take the risk for such longer time than the usual *fourteen* days as may be arranged, and intimation of such shall be made to Insurance Companies. (This arrangement is meant only to cover immediate buyer.)

N.B.—In this rule the days referred to shall be held to expire at twelve noon of the day following the expiry of the time specified or agreed to.

The following clause to be inserted in insurance policies:—

This insurance extends to, and covers any liability undertaken by, or resting on, the insured under the rules of the Glasgow Corn and Provision Trades Associations, as amended 15th January 1890.

Prior to this date a shorter rule was in force, reading as follows:—"In sales, *ex* store, fourteen days from date of sale shall be allowed for delivery, after which the goods shall be at buyer's risk and expense. Rent and fire insurance shall be borne by the sellers for said period. Sellers may by special written agreement keep buyers covered by insurance under their policies for any longer time as may be stipulated, and during that period sellers shall give buyers a right to indemnity under said policies for any loss by fire."

This rule was found to require revision, because of a decision in the Court of Session by Lord Trayner in a case, J. C. Stockman *v.* Crichton, Prentice & Co. The decision is somewhat involved and is too long to quote, but stated shortly it was to the effect:—(1) That the rules of the Glasgow Provision Trade Association were inoperative, because not within the knowledge of the seller as well as of the buyer; and (2) that, apart from these rules, "the lodging of a delivery order for an entire parcel

constituted constructive delivery," so that the cheese in question was at the buyer's risk. I need scarcely state that the Glasgow and Leith tariffs now recognise these trade rules.

We come now to consider the question of liability in respect of goods temporarily in the custody of some tradesman for repairs, and the law may be stated in the words of Bunyon. "A tradesman or workman who receives goods to work upon, as where a tailor receives cloth to be made into garments, or a goldsmith jewels to be set, is bound to exercise such care as an ordinary careful man would use," but this does not make him liable for risk of loss by fire, "unless he has entered into a special agreement to be responsible." In other words, primary liability lies not with the custodier, but with the owner. Here, also, it may be useful to cite a case which occurred recently.

The risk was that of a firm of coachbuilders, insuring stock, their own, "in trust, or on commission, for which they are responsible," but repudiating payment to customers after a fire at their works, on the ground that the risk lay entirely with the owners, and that therefore they were not in any way responsible. Numerous parties having carriages at the coachbuilders' premises, having failed to substantiate claims against the coachbuilders, made them against their own Offices, although the Offices only insured the carriages at the private stabling of the insured, and the results were various. Some Offices met claims *ex gratia*, after being satisfied the insurances were sufficient to cover the carriages at both the stabling and the coachbuilding works. One Office at least refused to pay, no doubt for good and sufficient reasons, and in this case the carriages are now covered by a floating policy at coachbuilders' premises in Great Britain or Ireland. Perhaps the most curious case was one made in respect of a carriage under the usual dead farming stock wording. At first sight it might seem that the condition of mind must be bizarre which could call a carriage an implement or utensil of husbandry. But on reflection one is constrained to admit that a gig, for example, used by a farmer in working or supervising the work of his farm, or in going to market, is an implement of husbandry, but a carriage used for pleasure could not be so described.

The coachbuilders might, of course, have protected their customers, but they would require to be more exact in their cover than some coachbuilders, who wrote to a customer—

"Your waggonette which is at present stored in our premises here at present is covered by our insurance policy." The protection, as worded, is practically useless, being confined to the precise moment at which their precious (save the mark) letter was written. Some coachbuilders charge their customers with the premium for insurance over and above the charge for storage, and in such a case one would express the hope that the cover is more effective than this letter.

Some customers take out their own insurance by means of what is called a *blanket policy*, with a clause somewhat as follows:—"One carriage or conveyance left for repairs on the premises of any carriage builder in the United Kingdom shall be held insured as described in the policy for a sum not exceeding £100, and for a term not exceeding three months from the time of its removal from the insured's own premises."

In this connection a nice question arises as to the exact position, in the event of a fire, where this blanket policy runs simultaneously with, and of course overlaps, a policy of the coachbuilder covering customers' goods; but as the question arises also in connection with laundry insurances, we shall pass on to consider them, and deal with this question when discussing the subject more generally.

It seems scarcely necessary to repeat that these illustrations only partially exhaust the subject, but, as our worthy President suggested on the occasion of our last meeting, we have not arrived at all-night sittings, so that some selections had to be made, and these examples from recent experience lay readiest to hand.

The laundry question was in the early part of this year debated in the Larkman case, which was heard before an arbitrator at the Arbitration Hall, Chancery Lane. The laundry proprietor, in this instance, had on his price-list a memorandum to the effect—"Customers' linen insured against fire while under our care"; and he had a policy with an item reading—"On goods held in trust, and for which the insured is responsible."

The claim was disputed by the Office on the ground that the policy did not cover the customers' interest, but only the insured's interest, and in the view of the company he had no interest.

The finding of the arbitrator set aside all the evidence with regard to custom, as not proving that any liability was so set upon a laundry proprietor, but admitted his claim in respect of contract in individual cases where he could prove that the words on the

price-list—"customers' linen insured against fire while under our care"—had been brought to the notice of his customer, and where he could prove the existence of a verbal contract between himself and his customer; which is precisely in the line of the law as set forth by Bunyon (already quoted), viz., that by *special agreement* a tradesman can make himself liable for risk of loss by fire to his customers' goods.

As a result probably of this case, the National Laundry Trade Protection Association, Limited, have arranged with a leading Office to undertake laundry insurances with the following clause for customers' linen—"On goods in trust for which the insured is held responsible by such of his customers only where goods are not insured by any other policy."

The words are characterised by the Trade Protection Secretary as simple and considered to convey the laundryman "over the many pitfalls that arise under the wording on this point in general use." They are certainly artful, since the question of legal responsibility is dodged, so to speak, and determined not by the laundryman but by the customer, but they very wisely postpone the insurance to any the customers themselves may have.

The *blanket policy*, already quoted, states that policies "insuring household goods, linen, wearing apparel, &c., shall extend to cover such property, whilst temporarily deposited at any laundry in the United Kingdom, up to twenty per cent. of the total sum insured."

We may now review the question generally, and if it is still not true—although Bunyon suggests it might be inferred—"that any lawful possession creates an insurable interest," it will be agreed, I think, that I have demonstrated that while, as a general rule, Offices make responsibility a prior condition to the insurance of customers' goods, they do not always do so, since, to take the most extreme case cited, some are willing to accept an insurance on customers' goods though the insurer has no responsibility in law, and by his own contract with his customer has also endeavoured to establish the principle that he has no responsibility in custom or usage either. One can, however, believe that such an insurance is sought in the expectation that if the goods are destroyed by fire, and could not be delivered, the insurance would be, not merely a protection for the customer, but for the merchant against any action the customer might bring.

The protection, however, might be one which could only be upheld in Prospero's Court. It is as likely as not to melt "into air, into thin air, and, like the baseless fabric of a vision, leave not a rack behind."

But if intention instead of responsibility is to be the condition of the insurance, it makes it all the more incumbent on an Office to be satisfied that the moral hazard is nil. Otherwise, an insurer having this *No Liability* clause on his invoice might be tempted, after having settled for the customers' goods with the Insurance Company, simply to make a composition with his customer. He could say to his customer—"I am not in law responsible for your goods, and our contract makes it plain that I am not liable for them, but I have succeeded in screwing something out of my Insurance Office (how much he need not say), and as I am desirous of retaining your custom I have pleasure in passing so much over to you (which need not be the sum received from the Insurance Company) as some contribution to your loss."

I have expressed the danger of such an insurance mildly, and, singularly enough, while travelling from Glasgow by train some time ago, I heard this very question (in reference to a laundry insurance) discussed by two gentlemen who seemed to be commercial travellers.

Their discussion (which I could not help overhearing), was exceedingly interesting, as the views of outsiders on any Insurance question always are to one engaged in the business, even if they are not always enlightening. In this case it was refreshing to hear one of the men contend very strongly that an Insurance Company could only be made liable for customers' goods if the insured had made himself legally responsible for them, and this, as the other man in the train contended, he must do by some precise intimation. Otherwise, he went on to say, and this is perhaps the most interesting part, having settled with his Office, he could put the money in his pocket and say to his customer, "You may go to —— Banff." These were not the exact words used, but to a Scot they will convey some sense of the vigour of the language employed.

What the man in the train would have said if I had told him that a case such as I have imagined is actually known to have occurred, and that notwithstanding, and even in the face of a clear intimation by an insurer that he was not liable for customers'

goods, some Offices were willing to let him insure these goods, I leave you to imagine.

It has been suggested to me that an action for restitution of money so pocketed might be raised, and that where Offices pay *ex gratia* they might perhaps advertise the payment, so as to put the customers in possession of the facts.

If the Office in question has been wisely guided in the matter they will have made the insurance a postponed one, so far as the customers' goods are concerned, only operative for them in the event of the customer having no insurance of his own.

And it would also seem to be necessary that the words "for which he is (or they are) responsible" should drop out of such contracts altogether, because if intention to insure customers' goods, apart from any responsibility, is to be generally recognised —then the words are, in such cases, worse than useless, unless it is to be contended that the responsibility is assumed, and arises out of the insurance.

In passing, one ought perhaps to note that, in accordance with a decision as to an insurance on some tea at Beal's Wharf, the words are held to apply to the whole clause—"In trust, or on commission."

It is of comparatively recent date that the words "For which he is (or they are) responsible" were introduced into insurance contracts, probably, as Bunyon suggests, in view of the decision in the case of Waters *v.* the Monarch Fire Office, which was to the effect that wharfingers who had effected an insurance on goods —"corn and flour, their own, in trust or on commission"—could recover not merely for their own charges for landing, wharfage, and cartage (as was admitted by the Office), but also as trustees for others beneficially interested.

The late Mr. Charles Stewart, in his Presidential Address to the Insurance and Actuarial Society of Glasgow in 1885, expressed the opinion that "the alteration was made without weighing fully the advantage and great convenience to the mercantile community generally of retaining the old form of specification." May we not go further, and suggest that, until the law makes the custodier responsible, it would be to the advantage of the companies themselves to revert to the old form of specification, chiefly because it clears the contract of words which we have seen, in some typical cases, are contradicted by the facts.

A few days ago I heard of the completion of a laundry insurance

without the words "for which he is responsible," the policy reading only "on stock-in-trade, the property of the insured, or held by him in trust or on commission."

Some years ago the Edinburgh Master Printers' Association made application for the issue of policies insuring "stock-in-trade held by the insured in trust for others (but for which they are not legally responsible)," but this was officially discouraged and characterised as "very undesirable" and "highly undesirable."

The object of both specifications is precisely the same, namely, to provide insurance where legal liability has not been assumed, or is in doubt; and as the second form of wording has been officially condemned, we may assume it is the wrong way of doing the thing. Conversely, since the first form of wording has been adopted by an Office of repute, may we assume it to be the right way of doing the same thing?

Two necessary conditions of an insurance on customers' goods where there is no liability would seem to be—(1) That the insurance is sufficient to cover not merely the insured's own goods, but also his customers' goods, and (2) that there is no insurance by the customer.

The first of these conditions would practically be secured by the average clause, which would protect the company from paying a loss for which it had not received an adequate premium. And even in the case of a specific insurance, the clause ought also to be applied, if the insured is to be kept firm in his intention to insure his own and his customers' goods.

The second condition is partly legislated for by the contribution clause, but in the event of a loss there might be considerable trouble in settlement, if the insurance is not, so far as the customers' goods are concerned, a postponed insurance, operative only after the customers' own policy is exhausted. And if the insurance on customers' goods is postponed in this way, the provision as to average might, as I have seen done in the case of some Bleach Works insurances in Lancashire, only be brought into effect if there was a claim by the custodier (distiller, or whatever he may be).

The principle for which we have been contending was established in the King and Queen Granaries case, although it operated in the reverse way. There the wharfingers who had made themselves liable had insured, and the merchants had also insured. Both insurances were independently ample to cover the property

at risk; and in the Court of Appeal it was decided that since the wharfingers had made themselves liable the loss must fall on their Insurance Companies; and that the merchants, and therefore the companies insuring them, were not liable. That is, in this famous case, loss fell on the Office insuring the party primarily liable, viz., the wharfinger, just as, in the extreme case I have cited, it should fall on the customer (or owner), since he only is liable.

Bunyon states that as a result, however, of this King and Queen Granaries case, Offices agreed "that where there are two or more subsisting insurances covering the same building of any kind, or the same contents of private houses, offices, churches, chapels, schools, hotels, theatres, or retail shops, or the same farming stock, any loss shall, *as between themselves*, be apportioned rateably amongst all such insurances, without regard to the rights and liabilities of the assured *inter se*"; but this statement of his is not strictly accurate, because the first effect on Offices was embodied in the report of a sub-committee to the effect "that it might be expected that Offices would settle losses on their strict legal responsibilites, instead of following the custom hitherto generally prevailing of all Offices on the risk contributing to the loss," and it was only after some years that the contribution agreement was promulgated.

But it might be asked whether this contribution agreement might not be made of universal application, and whether at the same time the law might not be stretched so that, as Bunyon almost suggested, "any lawful possession should create an insurable interest." But this would only cause the exchange of one set of difficulties for others. Imagine, for example, how difficult it would be to apportion a loss on goods at a laundry, where the laundry proprietor insured customers' goods along with his own in the same item, and where at the same time certain customers had a *blanket policy*, in which linen was insured along with household goods under the usual comprehensive wording. Apportionment in such a case would be an additional terror to the assessor, if he can be said to be a man who is ever afraid. Rateable apportionment is a counsel of perfection, only practicable where the range of the policies is much the same, and does not present such abnormal difficulties.

A curious Bleach Works case occurred a few years ago, and it is interesting, because one of the Offices concerned was one of the parties in the King and Queen Granaries case. In the Bleach

Works case an entirely opposite view was taken from the one successfully upheld in the former case. It is, of course, a trite saying that "times change, and we change with them," but one might very well infer from this Bleach Works case, and from some other facts we have cited, that the policy of Offices (to use the word in a general sense, and not in its usual technical sense) is one of opportunism—euphoniously called fair dealing between parties. The facts of this case are these. The bleachers, for years, had done work for one firm of manufacturers only, and had taken out a policy in this firm's name. After a time they did work for others also, and took out in addition a policy in their own name. Then the firm of manufacturers first referred to also took out a policy, and advised the bleachers they had done so. Some time afterwards the bleachers sent to the firm referred to, and to three other firms, letters in the following terms, namely—"Kindly note that we hold all cloths and copper rollers received by us from you fully covered by insurance against fire. Kindly acknowledge receipt, and oblige." A fire occurred, and this letter was, so far at least as the firm first mentioned was concerned, set aside, and the loss assumed partly by the manufacturers or by the company insuring them, not without protest, however, on the part of the company.

It has been asked, What is the use of taking any care at all in the drawing up of an insurance contract if it is to be set aside on any or every pretext? But that is the very spirit which would produce even more disputes than we have at present. And where for any reason an Office modifies its contract in the adjustment of a loss, the aim ought to be to have that and other similar contracts so drawn in the future that the question in dispute will not arise again. To wilfully use words leaving the exact intention of the contract in doubt is surely reprehensible.

But it is not only Insurance Companies who are sometimes careless in drawing up their documents, as you might gather from the coachbuilders' letter quoted earlier in the paper, and from a distiller's invoice recently handed to me, which bore the following curious clause:—"Distiller effects fire insurance policies over all spirits in his bonded warehouse to extent of original invoice to first buyer, but undertakes no responsibility beyond payment of the premiums."

What, apparently, this distiller desired to do by the last part of the clause is to guard against giving any guarantee of the

solvency of the company he insures with ; but in the very remote contingency of that Office not being able to meet its engagements, he would, I am afraid, be living in a fool's paradise, if he imagined that he was protected by these words against any action his customers might bring in respect of their goods destroyed by fire. He would, of course, require to make good the loss of his customer, and could rank as a creditor against the insolvent company.

The *double entente* is objectionable in contracts as in morals, and what we have to do is to ascertain as precisely as possible what an insurer desires to insure, and then, if we accept his proposal, our aim ought to be to set this forth in as accurate and concise a form as possible.

It would be too pretentious to think, however, that any suggestions in this paper, or that may arise in the discussion which I hope will follow it, will lead to a general revision of certain words in use among us, even though these have been shown to be in some respects faulty; but the paper, if it has done nothing else, will, I hope, have enlarged the horizon of some of the younger men connected with our Society.

Browning makes Paracelsus say in one place—

> "Truth is within ourselves :
> It takes no rise from outward things, whate'er you may believe."

and in another place that

> "*To know* rather consists in opening out a way
> Whence the imprisoned splendour may escape,
> Than in effecting entry for a light supposed to be without."

But for details of our business such as we have been considering, containing all the same, let us hope, some measure of truth, there is no such royal road to learning. All we can do is to acquire such knowledge as lies within our reach, and pass it on, as I have tried to do, even though that is done haltingly and in part.

ROBERT TAYLOR.

Insurance Society of Edinburgh,
November 25, 1902.

COLD STORES.

The application of refrigeration to the preservation of foodstuffs as we find it exemplified in our present-day cold stores is of so recent introduction that it can as yet hardly be said to have a history. A short space of about 20 years has witnessed its rise and development, and within this comparatively brief space of time it has assumed an importance perhaps second to none of the older methods of preserving.

A very brief reference to these older methods may be of passing interest. Broadly, they may be placed under three heads. First, the use of antiseptics, such as salt, borax, and of substances such as sugar and alcohol. Secondly, drying, examples of which process we find in dried fruit and vegetables, and in hot countries dried flesh—the Biltong of the Boers being an example of the latter. Lastly, the exclusion of air; and the enormous quantity of foodstuffs, meat, fish, fruit, &c., now preserved by canning, testifies to the value and importance of this method of preserving.

Refrigeration has the advantage over these methods in that the goods are maintained in more nearly their original condition, *i.e.*, in regard to their nutritive properties, appearance, and palativeness. Salt tends to harden flesh and make it less easy of digestion. Tinned foods all undergo more or less a preparatory cooking process.

There is practically no limit to the length of time meatstuffs may be kept under refrigeration. We have all read of the body of the prehistoric mammoth found some years ago buried in the frozen wilds of Siberia, the flesh of which, though it had lain probably for thousands of years, was still edible, and was eagerly devoured by the discoverer's dogs.

The enormous strides made in the progress of refrigeration can perhaps be best illustrated by a reference to the growth of our imports of fresh meat. It was about 1880 when the first shipment of any importance was made to this country. It consisted of 34 tons of beef and mutton from Australia, and was preserved on the passage by refrigeration. Last year, fresh beef, mutton,

pork, and rabbits were imported from North America, Argentina, Australia, and New Zealand to the value of approximately £14,500,000. The values of other imported produce, to which refrigeration was applied during transport, *e.g.*, butter and cheese from New Zealand, eggs, bananas, poultry, &c., reached the sum of over £13,000,000.

The foregoing figures, the growth in the number of cold stores, and the increasing use of refrigeration in various manufactures, are evidences of the very important part which refrigeration occupies in the country's economy. It has had the effect of greatly reducing the cost of living, and has consequently had a material influence on the health and well-being of the people.

Although our present system of cold storage is of recent date, it is, of course, no new discovery that foodstuffs can be preserved by keeping them at a low temperature. It must have been common knowledge in all ages that the progress of putrefaction is retarded by diminished temperatures. Meats keep better in cold weather than in hot weather, and as an example of meat preserving by natural refrigeration we may instance the practice of people in Northern latitudes, in Russia for example, packing poultry and carcases in snow to keep them while being transported from country districts to the large towns.

Putrefaction, which it is the object of refrigeration to prevent, scientists have proved to us, is due to the germination and growth of minute forms of life. Extreme cold does not destroy the organic germs but arrests their development.

Of the various methods of artificial refrigeration, that of the employment of freezing mixtures is doubtless the most ancient. A mixture of salt with snow or ice, in common use for ice-cream making, is the most familiar freezing mixture. Cold is produced by reason of the fact that the liquifaction of the solids—salt and ice—requires heat, which is extracted from the surrounding bodies, or, failing this source of heat, the liquifaction takes place at the expense of the heat contained in the bodies themselves. Some of the earliest shipments of chilled beef were kept at a low temperature by means of pipes in which a mixture of ice and salt circulated. Freezing mixtures need not further concern us here, as they are incapable of economic application for the purposes of cold storage warehouses.

A second method is that by means of the compression and expansion of gases. Air is the gas commonly used. The air is compressed in a cylinder by a piston. This compression is accom-

panied by an increase in temperature. The compressed air is cooled by water circulation, and is then allowed to expand. During expansion the temperature falls, and the cold air thus produced is used for refrigerating. Thus, if air at atmospheric pressure, and at a temperature of 70°, is subjected to a pressure of, say, 50 lbs. per square inch and cooled to its original temperature of 70°, then if it is allowed to expand back to atmospheric pressure, at the same time performing work, the temperature falls to, say, 82° below zero. Theoretically, if no heat were absorbed in the process, the temperature would fall to as low as 113° below zero.

Cold air machines are comparatively simple in their mechanism, and have been extensively used in cold stores. They are, however, being superseded by the more efficient and less expensive systems of "chemical" refrigeration, as exemplified in the ammonia and carbonic acid machines. The earlier shipments of frozen meat from Australia were by means of cold air machines. Cold air machines are still made and used to some extent, *e.g.*, where the extra coal consumption is not of great moment, and in out-of-the-way places, abroad or on board ship, where supplies of ammonia or carbonic acid are not readily available.

A third method of refrigeration—and that now most commonly used—is by means of the evaporation of liquids, a low temperature being produced by taking advantage of the fact that liquids in evaporating, absorb heat, this heat being termed the latent heat of evaporation. It is a law in physics that when a substance passes from a liquid to a gaseous state, it is at the expense of a certain amount of heat. *Vice versâ*, when a substance returns to a liquid state, heat is given off.

Among the earlier forms of refrigerating apparatus were those designed for producing cold by the evaporation of water, by what is known as the vacuum system. A vessel containing water is connected with an air pump. The reduction of the air pressure on the water encourages evaporation, and the moisture given off by this means is absorbed by strong sulphuric acid. The greater part of the heat required for this evaporation is extracted from the water, which falls in temperature below freezing point, and consequently ice is produced.

This type of apparatus is still used to a small extent. The Pulsometer Engineering Company advertise a small hand machine, the primary parts of which consist of an air pump and a sulphuric acid chamber. The purpose of this machine is to cool decanters of water and to make small blocks of ice.

Numerous substances have been used as refrigerants in the evaporation system. Many machines, for example, have been devised in which ether has been employed. Sulphurous acid has been, and is still, used to some extent. The substances, however, which are most commonly in use at the present day are ammonia and carbonic acid.

The numerous forms of refrigerating machinery introduced and used during the middle of the last century appear to have been employed for making ice only, and were not applied to producing directly low temperatures in store places, ice being employed for the latter purpose. In 1875 ice was used for preserving fresh meat in transit from America to this country. It is still, of course, largely used in small private stores and for land transport purposes. Ice, however, is not economical for cold stores, and does not give satisfactory results, owing probably to the moist atmosphere it produces.

There are two types of refrigerating apparatus in which a low temperature is produced by the evaporation of liquids. First, the Compression system, which is that commonly used in cold stores, and, second, the Absorption system, which is adopted for use in small private stores. In the latter system advantage is taken of the fact that water will absorb a large quantity—over 600 times its bulk—of ammonia gas. The following is a brief description of one of the absorption machines now on the market:—A tank containing strong liquor ammonia, that is, water containing in solution a large quantity of ammonia gas, is heated by steam pipes. The ammonia is driven off at a pressure of, say, 120 lbs. per square inch. The gas then goes by a pipe to a condenser, and, on cooling, condenses to a liquid. The liquid then passes through a valve into the expansion coils, where the pressure falls to, say, 15 lbs. per square inch. This reduction of pressure causes the liquid to assume a gaseous form, and the temperature falls many degrees below freezing point. The expansion coils are immersed in a tank of brine, the latter being consequently brought to a low temperature. From the brine tank, pipes are laid which distribute the brine through the cold storage chambers, or the pipes are utilised for extracting heat in any other way that may be desired, for example, for cooling liquids. The brine is kept in constant circulation, passing from the tank through the cooling system and back to the tank again. The ammonia gas on leaving the brine tank, from which it has extracted heat, is conveyed to another tank containing cold water, which absorbs the gas, forming liquor

ammonia. In course of time the liquor in this second tank becomes stronger than in the first liquor ammonia tank, and at a certain point steam pipes are tnrned on in it, the first tank being allowed to cool and then used for absorbing ammonia from the expansion coils, the two tanks thus reversing places.

The following diagram explains the working of the "Simplex" Absorption Machine, supplied by Messrs. Ransomes & Rapier (Limited), Victoria Street, London :—

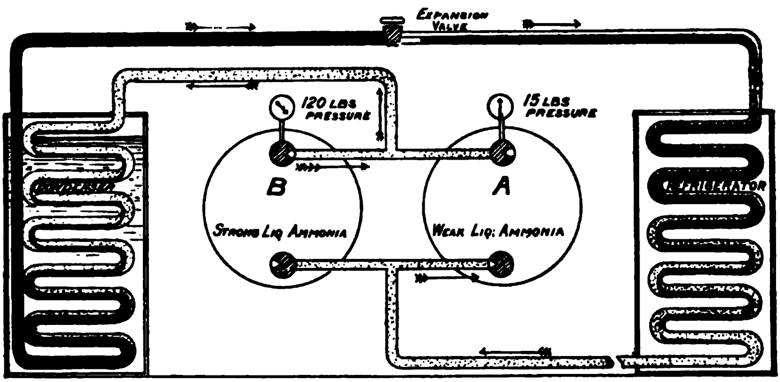


DIAGRAM EXPLAINING THE WORKING OF THE SIMPLEX MACHINE.

(RANSOMES & RAPIER, Ltd., 32 Victoria Street, London.)

The machine consists of two vessels, A and B, one of which (B) contains strong ammonia liquor, and is heated by a steam coil; the other (A) is filled with the spent liquor from the last operation, and is cooled by a water coil. Ammonia is given off in B under considerable pressure, and passes through the valve to the condenser, where, becoming cool, it condenses and passes to the expansion valve as liquid anhydrous ammonia. The expansion valve is regulated to pass the liquid according to the amount of heat to be abstracted or cooling to be performed. After passing the expansion valve the pressure disappears, and the liquid ammonia rapidly evaporates as it traverses the succeeding pipes and coils, producing a large volume of gas and intense cold. The gas, after passing through the cooling coils in the cold chamber, ice, brine, or water tank, returns to the machine through a valve, where it meets the weak cool liquor in vessel A, and is absorbed. The process continues until the charge in B becomes spent, and that in A is concentrated. Then the valves are closed, the steam and water in the coils reversed (by means of a valve not shown in the figure), and the opposite valves opened. A then becomes the high pressure or hot side, and B the low pressure or cool side. Each operation averages about one hour.

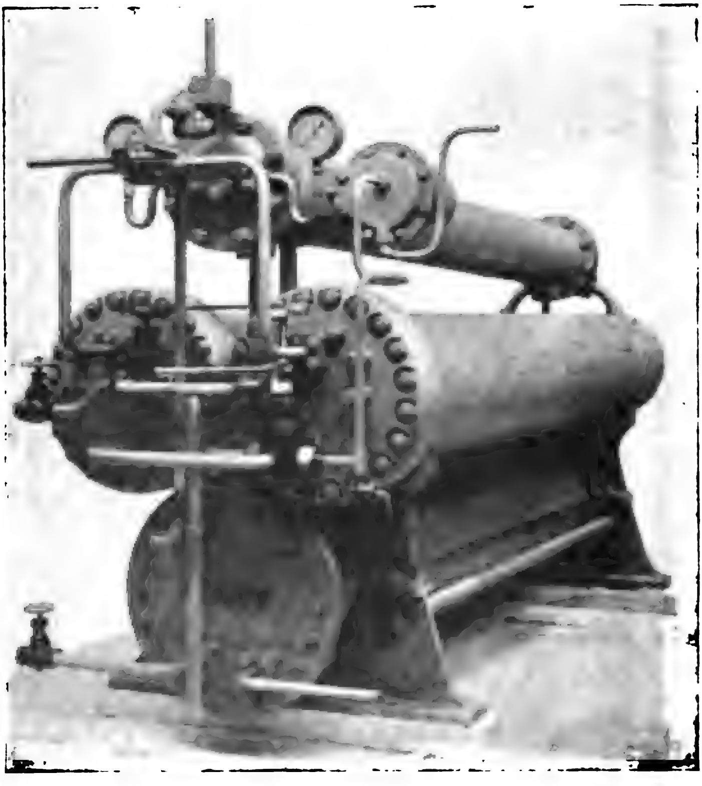
In a Compression Refrigerating Machine the processes operate in a cycle, which may be briefly described as follows :—

(1) The gas is compressed with a force which is sufficient, in

conjunction with the heat-abstracting capacity of the condenser, to transform the gas into a liquid.

(2) The gas on leaving the compressor passes through condensing coils, and by being thus reduced in temperature is changed into a liquid. The heat entailed by the compressing process, and by the conversion of the gas into liquid, is absorbed by the condensing water.

(3) The liquified gas is allowed to pass through a valve into a series of pipes, where the pressure is very much reduced, and in consequence of this reduction in pressure the liquid evaporates and assumes a gaseous form. In this transformation the gas falls to a very low temperature and abstracts heat from the surroundings. The gas is then drawn through suction valves into the compressor again and the cycle of operations is repeated.

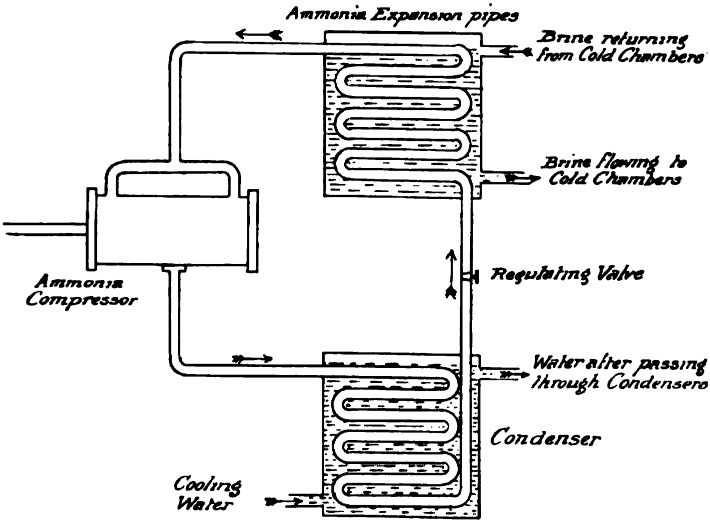


HIGH EFFICIENCY "SIMPLEX" MACHINE.

Marine Type.

(RANSOMES & RAPIER, Ltd., 32 Victoria Street, London.)

The following diagram illustrates the principle of the ordinary Ammonia and Carbonic Acid Compression Refrigerating Machines.



The ammonia—supposing it is ammonia which is being used—makes a current in the direction shown by the arrows. It leaves the condenser coils as a liquid and passes through the regulating valve " A " into the expansion coils. On the condenser side of " A " the ammonia is under a pressure of, say, 120 lbs. to 150 lbs. per square inch. On the expansion side the pressure is only, say, 15 lbs. to 30 lbs. to the inch, and as a consequence the ammonia, on passing " A," immediately vaporises, the heat absorbed in this change bringing the temperature down to, say, 5° F., *i.e.* 27° below the freezing point of water.

The cold gas passes through coils immersed in a tank of brine, absorbing heat from the latter, and is then drawn off by the compression piston through suction valves, and on the return stroke is compressed and discharged through delivery valves to the condenser.

The increase of pressure in the compressor cylinder is accompanied by a rise of temperature, say, to 110° F., and the hot gas giving up its heat to the cooling water surrounding the condenser coils resumes its liquid form at a temperature of, say, 70°, but varying according to the temperature of the cooling water.

In the diagram the expansion coils are shown as abstracting heat from brine, but the heat-abstracting properties of the coils may be used in several ways, *e.g.*—

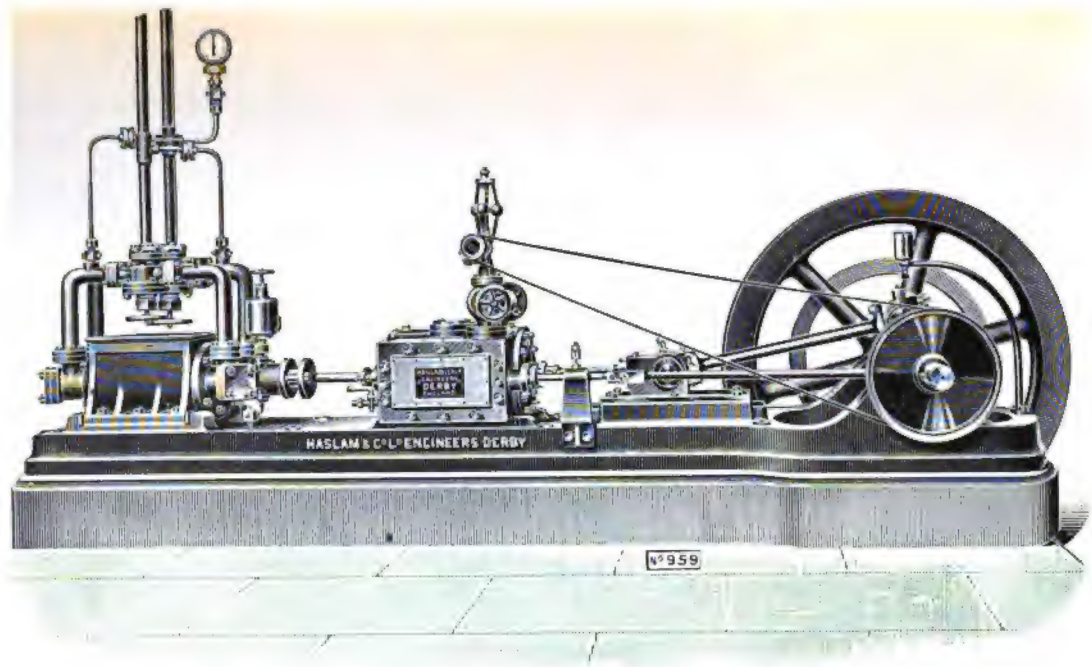
(1) The coils are immersed in brine as shown, and the latter is distributed through pipes to the cold storage rooms, absorbing heat from the latter, and then returning to the tank—a constant circulation of the brine being kept up.
(2) The expansion coils themselves are placed in the cold stores rooms, no brine being employed.
(3) Air is blown through the coils or over cold brine and circulated through the cold storage rooms.

The principle of the ammonia and carbonic acid machines are the same, but there are the following practical differences. The working pressure of the CO_2 machine is much greater—say ten times—than that of the ammonia machine. For extracting a given amount of heat the CO_2 machine is the smaller, the compressor being, say, only 1-4th the size of the ammonia machine. Ammonia exerts a chemical action on copper, while CO_2 does not, and this is a point in favour of CO_2 machines, more particularly in the case of marine installations. The ammonia machine is the one most commonly used in cold stores in this country. The CO_2 machine is found in the majority of marine installations.

Having said this much in regard to the principles of refrigerating machinery, we will proceed to review the features of an ordinary cold storage risk. The main parts are simple—viz., boiler house, engine and compressor house, and the cold storage chambers.

The boiler house calls for no comments. A boiler house at a cold store differs from no other boiler house.

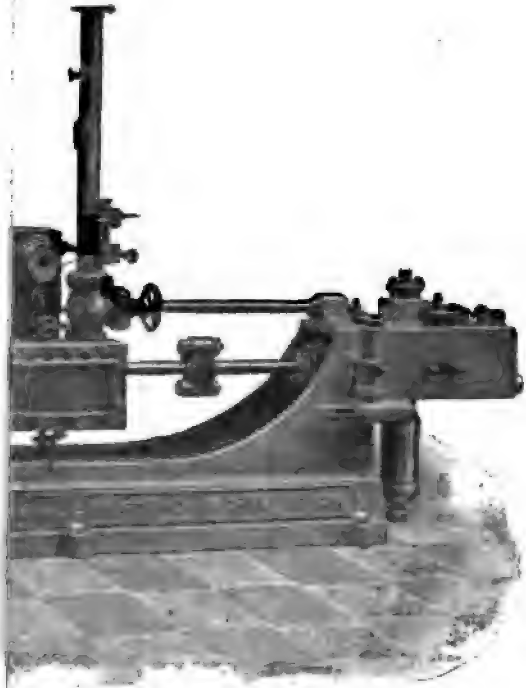
The engine house likewise possesses no special features. In addition to the ordinary parts of a steam engine there are, of course, the compressor cylinders with their valves and connections, but these do not call for special remark. There may be a slight leakage from the compressors, but there appears to be no practical danger from this. Ammonia is slightly combustible when mixed with a proper proportion of air, and burns feebly with a greenish-yellow hue. When mixed with about twice its volume of air it is capable, under favourable conditions, of exploding, but judging from experience the practical risk of such an explosion is very small. The smell of ammonia is very noticeable, and leakage therefore is readily detected.



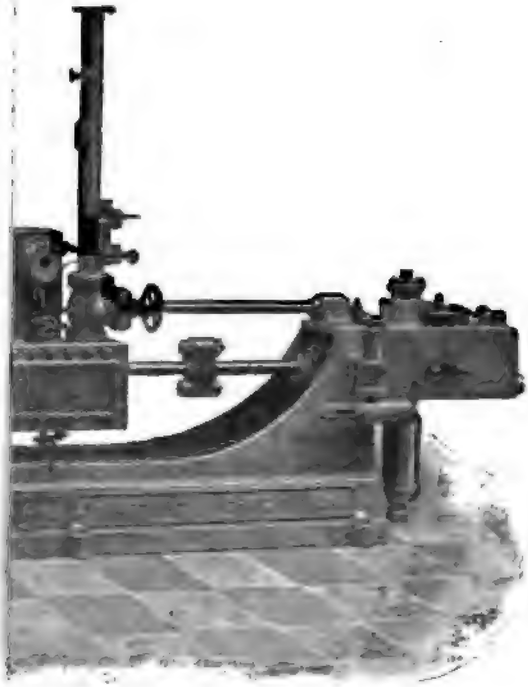
HORIZONTAL TANDEM STEAM-DRIVEN MACHINE.

(HASLAM FOUNDRY AND ENGINEERING COMPANY., Ltd., Derby.)

Horizontal ammonia compression refrigerator, driven by a high pressure steam engine placed in front of compressor on the same bed-plate. The ammonia compressor is double-acting.



E, WITH STEAM ENGINE COMBINED.]



E, WITH STEAM ENGINE COMBINED.]

Carbonic acid is inodorous, is incombustible, and will not support combustion.

It may be remarked as a matter of interest that refrigerating engines work at a comparatively low speed, say, 40 to 60 revolutions a minute, the ammonia compressors giving the best results when working at this rate. A common size for ammonia compressing cylinders is about 11 in. diameter by 20 in. stroke.

Frequently there are in the engine house dynamos for lighting the premises and for supplying power to electro-motors for hoists, pumps, and fans. The dynamos are worked by separate small high-speed engines.

In regard to the cold storage chambers themselves, these differ from the storage rooms at an ordinary provision warehouse only by the fact that they have an insulating lining; they have no natural light, as windows would allow the passage of heat from the outside; and the rooms are kept at a low temperature by means of—

(1) Brine pipes;
(2) Cold air; or
(3) Ammonia expansion pipes.

Brine. The brine ordinarily used is a solution of common salt and water, or of calcium chloride and water, both of which have low freezing points. A solution, for example, containing 20 per cent. by weight of calcium chloride has a freezing point of 5° F., *i.e.* 27° below the freezing point of water. The brine is cooled, as already explained, by the expansion coils, but the following is a more detailed description of the process and the apparatus.

The hot ammonia gas on leaving the compressors in the engine house is taken by pipes to the condensers. These consist of long lengths of piping, say, $1\frac{1}{4}$ in. to 2 in. diameter, arranged in coils or zigzag fashion. They are cooled by being either—

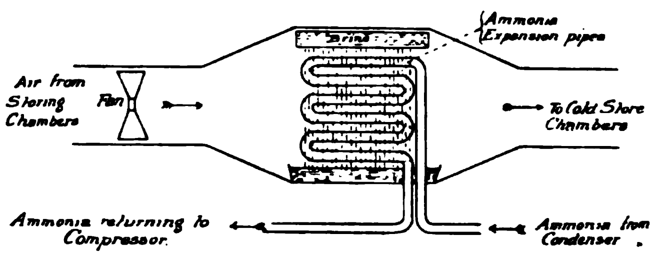
(1) submerged in a tank of water through which cold water is constantly passing, entering at the bottom and flowing out at the top, or
(2) placed in the open, say on the roof, water being allowed to trickle over them from pipes fed from pump or overhead cistern. The water falls into a receiving tank placed below the condensing pipes and either runs to waste or is pumped up, a continual circulation being thus maintained.

On leaving the condensers the ammonia, now in liquid form and at the temperature slightly above that of the cooling water, is taken to the expansion coils, an adjustable valve regulating the amount allowed to pass. The expansion coils are a series of pipes arranged after the style of the condensing pipes, immersed in a brine tank. The ammonia on passing the regulating valve vaporises and falls in temperature. Heat consequently flows from the brine to the expanded gas. The brine is thus brought to a low temperature and is forced by pumps through the pipes in the cold storage chambers, a constant circulation being kept up. The annexed illustrations of one of Messrs. J. & E. Hall's steam-driven Land type Machines, also of one of their small Marine type Carbonic Refrigerating Machines, as used for the storage of passengers' provisions, will be of interest.

The brine pipes in the storage chambers are fixed in rows usually against the ceiling. The air as it is chilled by coming in contact with the pipes becomes heavier and consequently descends; the warmer air takes its place, and circulation of the air in the chambers thus takes place.

Cold Air. Where cold air is employed for keeping the storage chambers at a low temperature, the air is cooled by being blown by a fan—

(1) Through coils of expansion pipes, brine being allowed to flow over them to prevent ice or snow forming, and so lessening their efficiency (*see* Sketch).



(2) Through coils or rows of piping in which brine, previously cooled by the expansion pipes, is circulated.

(3) Over surfaces of cold brine previously cooled by the expansion pipes. This cold brine is presented to the air in a variety of ways, *e.g.*—

(*a*) Flowing in thin films over sheets of corrugated iron or of canvas, the brine trickling from pipes or tanks overhead.

(*b*) Revolving discs, the lower halves being immersed

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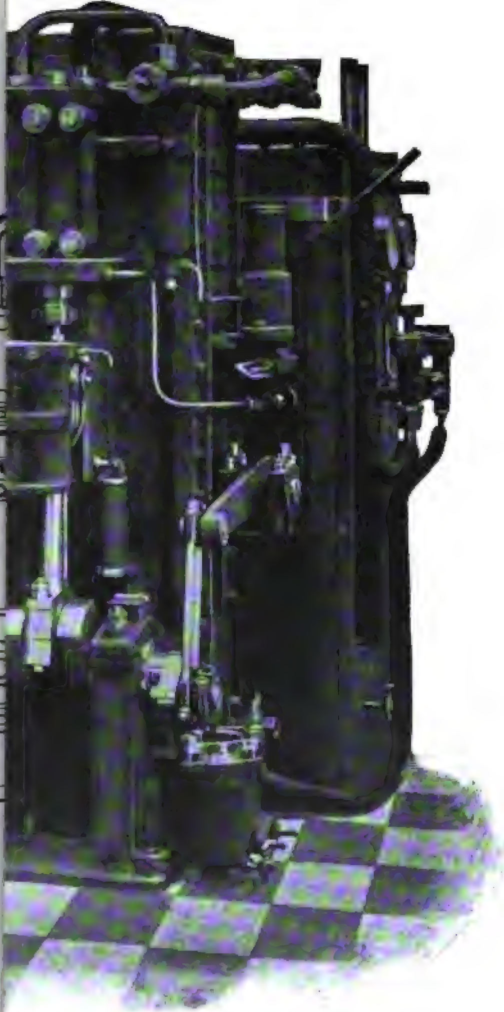
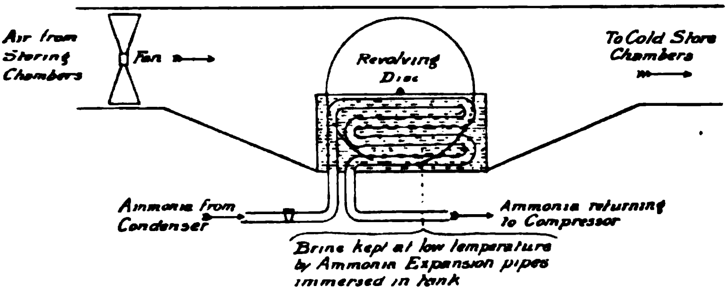


IR CARBONIC REFRIGERATING MACHINE.
ERTICAL MARINE TYPE.

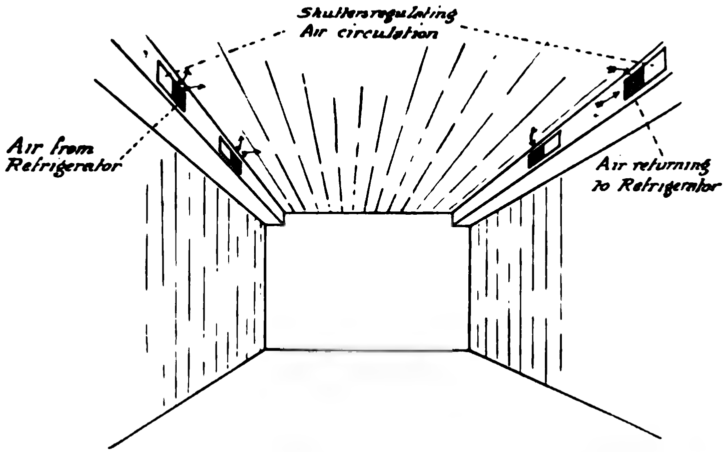
in the brine and the upper exposed to the air current (the discs are of metal, say, $\frac{1}{16}$ in. thick, and threaded in a shaft 1 in. to $1\frac{1}{2}$ in. apart) (*see* Sketch).

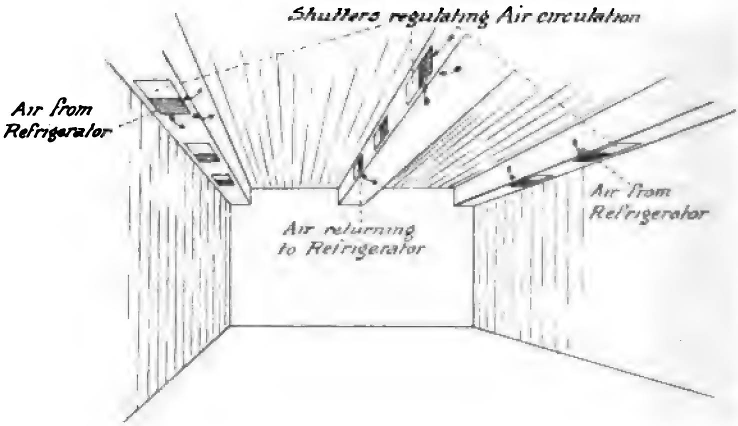
(*c*) Sprays of brine from overhead sprinklers.



The air-cooling apparatus is usually placed on the top storey of the storage building, the power then required for circulating the air being less than when the apparatus is on a lower level, as the cold air has a natural tendency to fall, and the warmer, returning from the chambers, to rise.

The cold air is taken to the chambers and returns from them by timber ducts, say, of two to three square feet or more, in sectional area. The ducts are usually placed against the ceiling, say, one at each side of the room. They have sliding doors, each, say, a foot square, in them at intervals of a few feet to regulate the amount of air passing through the room, and consequently the temperature. The duct at one side of the room is connected with the pressure side of the fan, and the other with the exhaust side. Thus constant circulation is kept up, the air being forced by the fan through the cooling medium (expansion coils or brine) thence to the cold chambers. It passes through the chambers, and by the return ducts is drawn back to the fan. The following sketches illustrates how the ducts are arranged in a storage chamber :—





The air returning from the rooms is warmer than that entering the rooms, and the moisture it contains is condensed when the air is cooled again by the cold brine. In the cold-air system, therefore, moisture as well as heat is extracted from the storing rooms. As the moisture is absorbed by the brine the latter gets greater in volume and consequently weaker. The surplus solution has to be drawn off, and either fresh additions of calcium chloride made or the surplus water driven off by boiling.

It may be remarked that one disadvantage of cooling the air by direct contact with the expansion pipes is that the air is apt to become too dry, and consequently to have a mummifying effect on the carcasses. The intense cold of the pipes causes the air to deposit too much of its moisture. A medium moisture in the air has to be aimed at.

An advantage claimed by the cold-air process is that it prevents the accumulation of any foul air which may settle in parts of chambers which are closed up for any length of time.

On page 69 are given plan and section of a small store cooled by cold air. The air is cooled by being blown between sheets of corrugated iron over which cold brine is flowing.

Direct Expansion System. In this system the ammonia from the condensers is expanded in zigzag ranges of piping fitted up in the cold chambers themselves. There is thus no intermediary brine tanks or other apparatus. The expansion pipes are arranged grid-iron fashion against the ceilings or walls, or as otherwise may be most convenient, according to the size and shape of the rooms. There may be more than one regulating valve for the ammonia for each room, so as to better regulate the temperature.

In all these three systems of cooling—brine pipes, cold air, and direct expansion—it will be seen that the heat extracted from the storage rooms is absorbed by the ammonia or CO_2 as the case may be. The latter leaves the condensers as a liquid at, say, 60°, and returns to them after passing the compressor as a hot gas, but part of this heat is due to the work of compression. Thus it will appear that the heat extracted from the chambers ultimately finds its way into the condensing water.

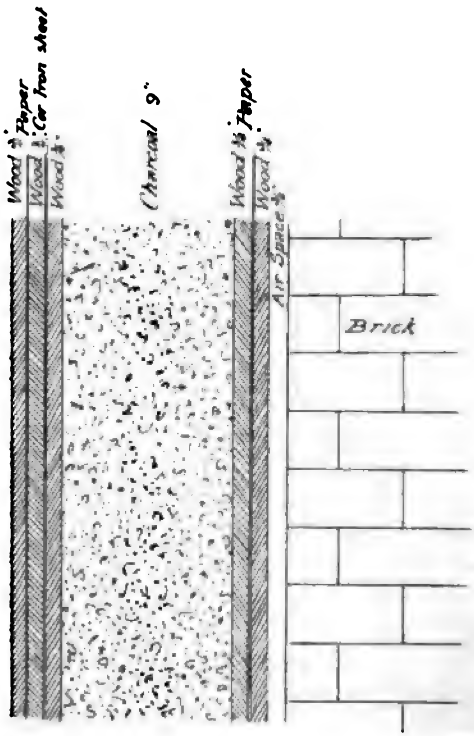
The amount of heat to be extracted from the storage chambers depends on the temperature at which the chambers have to be kept, the temperature of the goods when placed in the store, and the amount of heat which is constantly leaking through the walls of the building and insulating linings to the chambers, the amount of this leakage varying with the difference in temperature between the outside air and the air in the chambers, and depending also, of course, on the efficiency of the insulation.

The temperature required to be maintained in cold storage chambers varies according to the class of goods. Mutton, for instance, may be frozen hard without injury, and the chambers may be kept at any temperature below 26° F. For most articles, however, a few degrees above or below the freezing point of water seems to be the most suitable temperature. Beef should be kept at not below 28°, otherwise it freezes, and this seems to burst the organic cells, and on thawing the juices exude, giving the meat a bright shining appearance. Temperatures below freezing point likewise cause deterioration in other classes of goods. Eggs, for instance, require to be kept at 32° to 35°; fruits from 36° to 45°; hops from 33° to 40°. In regard to hops the advantage said to be gained by cold storage is that their colour and appear-

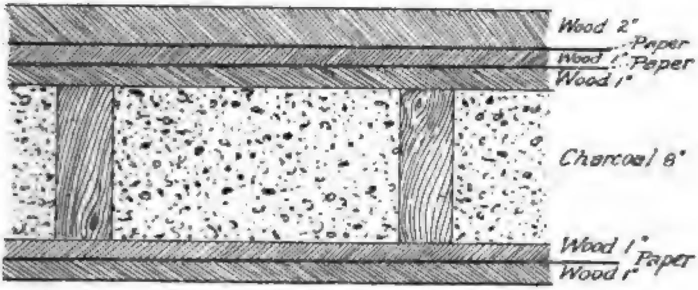
ance is better preserved, and there is less loss of the flavouring essence they contain.

Insulation. Once the temperature of a cold storage room is brought down to the required level, it is obvious that no further application of the refrigerating apparatus would be necessary if there were no leakage of heat through the external walls. In the case of a room separated from the outside air by ordinary brick walls and windows, there would be a considerable flow of heat through the walls and windows, the amount of heat varying with the difference in temperature between the inside of the room and outside. There are no means by which this transmission of heat can be entirely prevented, but the flow of heat is reduced as much as possible by lining the storage chambers with insulating materials.

The insulating lining invariably consists of a packing of some non-conducting substance in a divided state, placed between wood boarding. The following sectional sketches of the insulating lining at a cold store in this neighbourhood are typical of the insulation at cold stores generally :—



Insulating Lining of External Walls.



Insulated Floor.

The materials which are mostly used for the insulating packing are probably charcoal and slag wool. Numerous other substances, however, have been used, *e.g.*, rice husks, granulated cork, saw-dust. In a small store seen by the writer, erected some years, boiler ashes had been used. Hair felt is one of the best insulators, but is comparatively expensive. It is used much on board ship and in railway refrigerator cars on account of the small amount of room it takes up. Washed cow hair is also largely used on board ship with satisfactory results.

These insulating packings are insulators by reason partly of the materials themselves being poor conductors of heat, but mainly by reason of the fact that they contain a large quantity of air in the interstices between their particles. Thus, if charcoal or any of the other materials named be reduced to fine powder and very tightly rammed the insulating properties are lowered.

While air, under the conditions described, is a good insulator, an open air space, *i.e.*, without the packing material, does not afford good insulation. The reason for this is that heat is transmitted through the air by radiation and by convection currents. Air, further, has the drawback that it has a low specific heat, that is to say, a comparatively small amount of heat will cause it to rise in temperature. A charcoal packing newly put in may take weeks to get thoroughly cool, *i.e.* down to freezing point or lower, but when the normal temperature is attained, the packing acts, as it were, as a reserve of cold, so that when the machinery stops the temperature of the storage chambers will rise but very slowly.

The packing material, besides being a poor conductor, should not be hygroscopic—that is to say, it should not readily attract or absorb moisture from the air. A certain amount of moisture is

inseparable from cold stores, and if the packing material becomes damp the efficiency of the insulation falls considerably. The possibility of moisture getting access to the insulating material is met by making the wood boarding containing it, as air-tight as possible, and by interposing sheets of waterproof paper between the layers of boarding.

In the case of the insulating lining, sketched on page 74, the thin sheets of galvanised iron have been inserted with the object of preventing rats finding their way into the chambers.

In regard to the sketch illustrating the floor construction, it is usual to insulate the floors in some such manner, but the insulation of the floors other than the ground or lowest floor, is not so important as the insulation of the walls, as the difference in temperature between two cold storage rooms will never be very great, so that there could not be much flow of heat through the floors. In one large store not far from here the floors are of 3-inch plank resting directly on the iron beams and covered with two thicknesses of $\frac{7}{8}$-inch board with paper between—no other insulating material being used.

Besides insulating the walls, floors, and ceilings it is usual also to place insulating material round the iron columns and iron girders supporting the floors. Iron is a good conductor, and the object of the insulation is to prevent heat, which may pass to the iron work from the outer walls or foundations, from entering the chambers. The ends of the girders and columns are coated with asphalt with the object of preventing heat from getting access to them.

The floor of the basement or lowest storey has also to be insulated to prevent heat leaking from the earth, also to prevent the earth freezing and causing the flooring to bulge. A really good floor should consist of a rubble foundation; two layers of concrete on this with an intermediate layer of asphalt; and on top of this, battens with double boards to form the floor, the space between the battens being filled up with insulating material.

As will be appreciated, the subject of insulation is a most important one in connection with cold stores. The more effective the insulation the less work there is for the refrigerating machinery, and consequently the less the working expenses.

The maintenance of the proper temperature in the storage rooms is an important point, and it is usual to find ordinary liquid thermometers suspended in each room and direct readings

are taken at stated intervals, say, three times a day, and reported to the engineer. There are, however, thermometers on the market by which the temperature can be read off at a distant point—say, in the engine room. One of such thermometers consists of a coil of thin platinum wire wrapped round a mica core, the whole being enclosed in a brass tube. The two ends of the coil are connected with insulated wires, which are taken to terminals to which a wall plug can be attached, placed on a board at any convenient point, say, the engine room. The electrical conductivity of platinum varies with the temperature, and on connecting the terminals with a small battery circuit the temperature of the storage room can be read off on a measuring instrument.

Lighting. In the absence of windows, cold storage rooms are, of course, devoid of natural light, and incandescent electric light is the invariable illuminant. The only point that calls for special mention in this connection is that the dampness incidental to cold stores causes the breakdown of the ordinary insulation on conductors unless special precautions are taken, and lead-covered wires, are generally employed, with damp-proof lampholders and other fittings.

Ice Making. Ice manufacture is frequently an adjunct to cold storage premises, and a few words on the process are therefore called for.

In one method there is a tank of brine, say, 3 ft. deep, and varying in length and breadth according to the required output of ice. Immersed in the brine at suitable positions are grids of ammonia, or CO_2, expansion pipes, the temperature of the brine being thus brought down below the freezing point of water. The brine is kept in circulation by means of propellers so as to keep the temperature uniform throughout the tank.

The water to be converted into ice is contained in sheet-iron cans or moulds, say, 1 ft. by 2 ft. 6 in. (or of whatever size the blocks of ice are required to be), and the same depth as the brine tank. The cans are lowered into the tank, spaces being left between them, through which the brine can circulate. The brine absorbs heat from the water in the cans, and as the result the water is frozen into blocks.

In order that the blocks of ice may be clear and transparent it is necessary that the water during the process of freezing should be kept slightly agitated. The reason for this is that water under ordinary circumstances contains a percentage of air, and in freezing

the air separates, forming small cells in the ice, which gives the latter a white opaque appearance. If the water during freezing, is kept slightly agitated, the air escapes, and the ice produced is clear and translucent. By using distilled water which has been kept from contact with air, transparent ice can be obtained without agitation.

When the ice is formed, each can is lifted from the brine tank by overhead travelling hoisting apparatus and conveyed to the thawing tank—a tank of warm water. The can is dipped into the thawing tank, and the ice thus loosened is tipped out of the can and conveyed to the ice storage room.

In another system the sheet-iron ice moulds are fixed in the brine tank, forming a series of cells. The brine circulates between them. When the block of ice is formed the cold brine is shut off and warm brine circulated instead. The ice is thus freed from the sides of the cells and is lifted out by means of rope eyes frozen into the top of the block.

Instead of the cooling effect being obtained by cold brine the expansion pipes themselves may be placed in the hollow walls of the cells and the water frozen by this means.

Cold Stores as Fire Risks.

The experience so far gained of cold stores in this country has probably been too limited to enable us to form so definite an estimate of them as Fire risks from an Insurance Company's standpoint, as in the case of most other classes of risk. Opinions may be somewhat divided, and it will be interesting, therefore, to discuss this aspect of the subject.

It will perhaps be best to proceed by comparing cold stores with ordinary warehouse risks, say provision warehouses.

The first points we may notice are the engine and boiler hazards attaching to cold stores, which are absent from ordinary warehouses. The engine and boiler rooms are frequently detached or otherwise cut off from the stores, but this is not always the case. The boiler hazards call for no special comments—that is to say, a boiler house at a cold store does not differ from any other boiler houses. There is one point, however, which may perhaps be noted, and that is, if the boiler chimney passes through the main building it is necessary to cover up the part which may be exposed to the cold store rooms by wood casing and insulating material, so that any defect which may develop in the brick work will probably not be revealed until some damage has resulted.

With regard to engine houses, the large number of fires which

break out in engine houses suggest that the engine hazard is at least as great as that attaching to the boiler house. There is a further point in regard to the engine house at cold stores, viz., that fire damage to the engine and/or compressor—the engine and/or compressor forming one piece of apparatus—may be of such a character as to entail the entire stoppage of the whole refrigerating plant, in which case the loss involved would not merely be the actual damage to the engines, &c., but there would also be the consequential damage to the goods stored, through inability to maintain the requisite low temperature. Almost invariably the engine and compressor are in duplicate, but both are in the same room or compartment, and might both therefore be liable to disablement by the same fire.

I have a note of two engine house fires at refrigerating premises. One of these occurred in 1900 at a cold stores in London caused by explosion of a gas engine exhaust pipe, resulting in damage to the extent of £350. There were duplicate engines, and no consequential damage was caused to goods in store. The other occurred at an ice factory in Scotland in 1901. The fire started on a Saturday afternoon after the engineers had left, and appears to have originated in a wooden enclosure used for storing waste and general engine furnishings. The loss was £750, viz., building, £84; machinery, including ammonia compressors and dynamo, £666. No question of consequential damage arose, as the only stock was ice, and this does not appear to have been insured.

There are no special points in connection with these two fires, and they are merely instanced to illustrate some of the hazards attaching to cold stores where the engine rooms are not cut off.

In regard to the compressors, considered apart from the steam engine proper, and the rest of the refrigerating plant, these seem to present no special features of hazard. In the old types of apparatus, in which ether or other volatile and highly inflammable substances were employed as refrigerants, there was a very obvious hazard, but neither ammonia nor carbonic acid, the substances almost invariably used now, seem to be attended with any danger, though, as we have seen, the latter is probably the safer of the two. There is one point, however, which may be mentioned, viz., the liability of some part of the apparatus containing the refrigerant under high pressure, bursting. The contingency of damage from this cause would appear to be somewhat remote, but the following brief particulars of a loss at

Keillers' Confectionery Works, Dundee, in 1900 are of interest. There was a small ammonia refrigerating plant at the works in connection with chocolate making. The condensers and part of the plant were in a small boarded-off compartment, some fifteen feet square, on a floor of a storied building. An explosion of some part of the refrigerating plant occurred, and a fire ensued, resulting in a total damage of something like £50,000. It is supposed that some of the condenser pipes containing ammonia under pressure, had corroded on the outside, and becoming weak had burst, and that the explosion had ruptured the gas piping in the vicinity. Two gas jets were alight in the boarded-off compartment at the time.

Turning to the cold storage chambers proper, the most striking feature is the extensive lining of wood casing to walls and ceiling, packed with some insulating material such as charcoal. This insulating lining seems to clearly constitute a cold storage warehouse a more severe risk than an ordinary warehouse of usual construction. A great quantity of inflammable material is presented by which a fire could spread should one break out. At a cold store in London the chambers are lined with uralite, a non-combustible substance, of which the principal constituent is asbestos. The uralite is in sheets, like stout cardboard, and, in the stores referred to, is nailed against the wood casing containing the charcoal.

In regard to the insulating material itself, obviously a non-combustible substance, such as silicate cotton, is superior, from a Fire risk point of view, to charcoal or rice husks. In regard to charcoal, there is a suspicion—indeed, more than a suspicion—in some quarters, that it is liable to spontaneous combustion. Certainly freshly made charcoal is liable to ignite spontaneously owing to its rapid absorption of oxygen from the air, but the evidence to show that this liability attaches to charcoal under ordinary circumstances, *i.e.* not newly made, is not very conclusive.

In the "Economist" of January 28th, 1899, there was a rather alarmist article on the subject of the spontaneous combustion of charcoal. The article referred to a number of fires which had broken out on board ships containing cold storage chambers, insulated with charcoal, and went so far as to say that "charcoal insulation on board ship is highly dangerous and should be prohibited." Professor Vivian Lewis is quoted in the article as having stated in a lecture that "a heap of charcoal powder of one hundred bushels or more will always ignite." Although it must

be accepted as a fact that numerous fires have been discovered on board ship where charcoal insulation has been involved, it does not appear to have been clearly established that the outbreaks have been due to spontaneous combustion. It must, of course, be admitted that charcoal is itself an inflammable substance, but if it possesses a serious hazard of spontaneous ignition, we should have had some conclusive evidence of it by this time in some of our cold stores at home. In a large number of instances the cause of an outbreak is unknown, and in the absence of any other plausible theory it is commonly the case that "spontaneous combustion" or "fusion of electric wires" is advanced as the cause of the fire.

Within the last few weeks we have had a fire in a cold store in this neighbourhood in which spontaneous combustion of charcoal was advanced as a probable cause. The building was new and not quite ready for occupation. The top storey was designed for cold storage, and consequently the roof had a lining of wood casing, packed with charcoal. The fire occurred in the roof about half-past ten at night from some cause which could not be traced. Spontaneous combustion was put forward as the probable cause, but the firm who supplied the charcoal scouted this idea, representing that it was an utter impossibility for their charcoal to ignite spontaneously. The alternative cause suggested is that sparks from some chimney in the neighbourhood might have lodged in the roof and fired it. The damage caused by the fire was £136 as far as the building proper was concerned and £240 for insulation.

Another feature about cold stores which affects the Fire hazard is the fact that there are no windows to the chambers. It thus might be difficult for firemen to gain access to the chambers. On the other hand, the absence of windows would prevent air getting access to the fire, and probably delay its spreading on that account. At this point it may be observed that where the system of cooling is by cold air circulation, a ready means of spreading a fire is afforded by the air ducts. These, as already described, are of wood, and the flow of air, if not stopped in time, would quickly carry a fire throughout the building.

A further important consideration, from a Fire Office point of view, is the susceptibility of the stock to damage (1) from fire, smoke, and water, and (2) from increase of temperature through breakdown of the refrigerating plant. The risk of loss from actual fire damage would seem to be small compared with the risk from

the other causes here referred to. Fresh meat will not readily burn, but is easily rendered unsaleable by smoke and water damage. In regard to the risk of loss to stock owing to fire damage happening to the refrigerating plant, and the consequent rise of temperature in the storage rooms, experience shows this to be a very important factor. The following particulars of a loss which occurred a few years ago at a cold store in the north of England will illustrate this point. The direct damage to stock—carcases of mutton—from fire, smoke, and water, was £300, but the Offices sustained a loss, in addition to this, of £900, on account of carriage and other expenses in connection with the removal of sound carcases to other cold stores in order to prevent their going bad. No other cold storage accommodation was available at the time in the same town, and consequently the stock had to be sent by rail to cold stores in other towns many miles away. In the case of the recent fire at the Scottish Cold Stores, Glasgow, there appears to have been very little loss on stock owing to actual fire damage, but considerable sums were paid on account of water and smoke damage and cost of transport to other cold stores in Leith and elsewhere.

In regard to the first named of the fires just instanced, it is worthy of note that the removal of stock was not necessitated by breakdown of the refrigerating machinery or apparatus, but owing to damage to the insulating material—charcoal and slag wool—and this brings us to another vulnerable point in cold stores, viz., the susceptibility of the insulating material to damage from water or moisture. Access of moisture to the insulation—whatever the latter may consist of—very materially impairs its insulating qualities, so that water damage alone may necessitate the entire removal of the goods from the store and the renewal of the insulating lining, both insulating packing and wood casing. To refer again to the fires instanced above, in the first case the loss on account of renewal of insulation was £1000. The building was a fireproof structure and sustained practically no damage. The loss on the machinery was £80 only. Incidentally, it may be mentioned that this fire broke out at 5 a.m. on a Sunday, and the cause was unknown.

In the case of the Scottish Cold Stores loss, the loss on account of renewal of the insulation, consisting of slag wool and timber linings, was £5000, and on the building proper £2400. The fire appears to have started on a staircase or landing on the Cold Storage Company's part of the premises, but from what cause is

unknown. The top storey, occupied by a warper, including the roof, was totally destroyed, but the fire was prevented from spreading to the cold stores, so that practically the whole of the £5000 loss on insulation was due to water damage. The loss on the refrigerating machinery and apparatus caused by this fire was £3900, and the total loss by the fire was about £20,000.

Particulars of two large cold storage fires abroad will be of interest.

Fire 2/9/99. The Jacob-Dold Packing Company, Kansas City, U.S.A.

The fire originated in the building containing the refrigerating plant, practically destoying this building and damaging buildings adjoining. There was a block of buildings used for cold storage 100 feet distant from the building containing the refrigerating plant, and this block was practically untouched by the fire. Owing, however, to the stoppage of the refrigerating plant, a loss of £32,000 was sustained on stock in this storage block, this sum representing the cost of transport of the goods to cold stores in neighbouring towns and the amount of deterioration of the meat through rise in temperature. The loss on the block where the fire originated was as follows :—

Building, . . .	£2,395
Machinery, . . .	30,918
Stock, ...	15,281

The total loss sustained at this fire was £91,477. It may be mentioned that the policies contained no clause in regard to consequential damage, but the companies admitted liability for the stock in the detached cold store. It seems to have been as the result of this loss that the consequential damage clause was introduced in policies in the United States. The wording of the consequential clause now in use there is very similar to, though not identical with, that which appears in our English Tariff.

Fire 29/11/02. Las Palmas Produce Co., Ltd., Zarate, River Plate.

The fire broke out at 10 p.m., from some cause unknown, in a newly erected three-storey block of cold storage chambers not quite ready for occupation, but nearly so. The building was brick built, with iron roof, iron columns and beams. The freezing chambers were divided by timber casings filled with charcoal. Good appliances and water supply appear to have been available, but the block suffered total destruction, including newly erected slaughter house and hide house adjoining and communicating. The fire was practi-

cally confined to the block in which it started, but considerable damage by heat and water was caused to the cold storage warehouses adjoining, in the occupation of the same firm.

The loss was assessed as follows :—

New Block.		
Building, including insulation, . .	£35,348	
Machinery and plant, . . .	8,070	
		£43,418
Old Block.		
Buildings, including insulation (large part of loss being on latter), . .	£5,600	
Machinery, ...	3,079	
Stock, ...	3,018	
		11,697
Total, . .		£55,115

To summarise in regard to cold stores as Fire risks, the main considerations in these, as in other risks, may be put down under three heads, viz. :—

(1) The possibilities of fires starting.
(2) The facilities offered for the spread of a fire should one break out.
(3) The susceptibility to damage of the building and goods stored.

In regard to the first point, the conditions of cold storage risks do not seem favourable to fires breaking out. There is a prevailing dampness in the buildings due to the moisture in the goods themselves and to the condensation of atmospheric moisture on the cold surfaces, and the goods themselves are not inflammable, though occasionally there may be straw in cases of eggs. Artificial light is required in the chambers, but incandescent electric light only is employed. The engine and boiler houses have, of course, their own hazards, but these parts of the premises are usually well cut off from the cold stores.

Respecting the second point, the extensive wood lining and insulating material, if the latter is combustible, is an unfavourable feature, comparing the risks with ordinary mercantile warehouses. Air circulation, where this method of cooling is adopted, would materially add to the chances of a fire spreading.

Regarding the third point, cold stores, as we have seen, possess exceptional features of their own, in respect to the

susceptibility of the insulation and the goods stored, to damage as the result of a fire, which make the risks compare unfavourably with ordinary provision warehouses, from a Fire Offices' point of view.

Before closing, it may be interesting to refer very briefly to the practice of the Offices in America in regard to cold stores, and the following are particulars taken from a rating schedule now in force in an important district in the United States. The normal rate for building is 10s., and for contents 20s. Then follows a lengthy list of extra rates under about 30 different headings, some split up into several divisions. We will quote a few of these extras:—

	s. d.	
Area—For each 1000 sq. ft. of ground area over 5000 sq. ft.,	0 5	per cent.
Height—For each 10 ft. over 50 ft.,	0 5	"
Boiler, &c.—If boiler or refrigerating machinery, be within building,	4 0	"
Insulation—If other than mineral wool be used,	1 7	"
Air circulation—If this system of cooling,	1 7	"

And an additional 1s. per cent. if there is not a damper at each floor.

Some of the other headings under which extras are provided are defective construction, external wood cornice, floor openings, lighting, boiler flues through building, plurality of tenure. There is also an extra of 1s. 7d. per cent. for "candling" by other than electricity, which draws attention to the danger of examining eggs by candle light.

In the schedule just referred to there is no mention of consequential damage to stock, but this is intended to be covered by the normal of 20s.

The following particulars are from another rating schedule in force in another large district in the States:—Normal rate in first-class town, 20s. building and 30s. contents, with extras of 10s. to 20s. for construction, the latter extra applying to buildings wholly constructed and roofed with timber. There are other extras under the headings of boiler, chimney, lighting, heating, exposure. This schedule also contains the following provisions in regard to consequential damage:—Consequential damage can only be covered by separate policy—distinct from that covering the ordinary Fire risk. The rate to be charged on such a policy is 50 per cent. of that applicable to the building, unless there are two independent sources of supply for the refrigeration, in

which event the rate will be 25 per cent. of that applicable to the building.

In another part of the States the rule in regard to consequential damage is to cover this risk without extras where there are two separate refrigerating plants out of risk of each other, and to increase the rate by 50 per cent. where these conditions do not exist.

In quoting the above apparently high rates current in the States, it is not, of course, intended to suggest that they should guide us in this country. They are quoted merely as a matter of interest. Experience shows that in many respects there are conditions operating in one country, materially affecting the Fire hazard, which do not exist, or which operate to a very different extent, in another country.

The following are particulars of fires in cold stores in the United States of America for the years 1894 to 1901 extracted from the New York Chronicle Tables :—

[TABLE

Fires in Cold Storage Warehouses in U.S.A. (as per N.Y. Chronicle Tables).

Year.	No. of Fires.	Total Loss.	Insurance Loss.	Causes.						
				Exposure.	Unknown.	Incendiary.	Sparks.	Spon. Combustion.	Electric Wires.	Miscellaneous.
		£	£							
1894	17	18,440	11,132	5	3	3	2	–	2	Cigar stub, 1; engine, 1.
1895	15	13,805	7,817	8	3	–	1	2	–	Defective flue, 1.
1896	12	26,455	21,665	2	3	2	–	1	1	Lightning, 1; ignition (grease), 1; friction, 1
1897	8	31,559	26,249	1	1	1	1	1	–	Carelessness, 1; engine, 1; defective flue, 1.
1898	9	12,980	11,360	4	2	–	–	1	–	Ignition (grease), 1; not reported, 1.
1899	11	11,991	9,241	4	5	–	–	–	–	Explosion (chemical), 1; oil store accident, 1.
1900	21	26,315	19,713	6	7	–	1	1	2	Accident, 1; ignition (chemical and tar), 2; tramps, 1.
1901	42	159,638	113,278	10	13	3	4	1	2	Candles, 1; defective flue, 1; boiler explosion, 1; gas jet, 1; ignition (grease), 1; ignition (paint), 1; ignition (tar), 1; lightning, 2.

Note.—*In regard to the fires caused by "Exposure," it is worthy of remark, that, according to the Chronicle Tables, 27·8 per cent. of all fires which occurred in the U.S.A. during the 10 years, 1892-1901, were due to "Exposure." It will be noted that the Jacob Dold Packing Company's fire is not included in the above statement, the loss being placed under the head of Packing Houses.*

J. A. BEWLEY.

Manchester Insurance Institute,
March 10, 1903.

LACE FACTORIES.

BEFORE dealing with the lace trade as we know it to-day, it is advisable to give a brief history as to its origin and development.

The trade in machine-made lace owes its origin to the stocking frame. The stocking frame was invented in 1589 or thereabouts by William Lee of Calverton, near Nottingham. This was improved upon from time to time, and in or about 1740 J. Strutt of Derby patented an independent selecting apparatus to be fixed to the front of, and which was really an addition to Lee's machine It could be so arranged as to pass a thread or pick one up, and was the beginning of ribbed hosiery manufacture.

This apparatus, showing that mechanical selection was possible, lies at the foundation of Morris's patents of 1764 and 1781 for making eyelet-hole ankles and insteps in ladies' hose, and Crane's patent of 1769 for looped net. In 1777 we find a reference to "the newly invented white silk lace."

The first lace machine making plain net only was constructed about 1770, nearly 200 years after the stocking frame; but it was not until 1795 that figured lace was made.

These machines varied very little from the ordinary stocking frame, but the time had now come when it was recognised that there was a future for this class of goods. Consequently, clever mechanics brought their whole energy and skill to bear on improving and perfecting these machines.

With this object, dozens of clever men gave their whole time, money, and energy, but failed, and it was generally understood to be an impossibility to obtain the motions necessary in any mechanical contrivance to make an exact imitation of pillow lace. This problem was, however, solved in 1808 by Heathcoat of Duffield, near Derby, without any assistance or co-worker. He was the son of a farmer, and was only 26 years of age at the time he patented this wonderful invention which is the basis of the existing industry.

In 1816 the hosiery trade was very depressed, and the wrecking of workshops and hosiery frames became common and extended

to the lace industry. It does not appear that the rioters resorted to fire for their purposes. Heathcoat at this time had a factory at Loughborough, Leicestershire, 15 miles from Nottingham, and 55 of his lace machines were broken. Out of eight of the men who conspired in the attack on Heathcoat's factory, six were hanged and two transported for life: a legal enquiry was held and Heathcoat's loss was assessed at £10,000, to be paid if he would re-expend the money in the county; but he refused to do this and consequently never received any compensation. He removed his works to Tiverton, Devon, became M.P. in 1832, and retained his seat till 1860. He died a rich man at the age of 78.

About 1823, when Heathcoat's patent was running out everybody in and around Nottingham was afflicted with what was called the "twist net fever," in other words they were going mad over the money to be made in the lace trade. The ordinary workman could command high wages, averaging £10 to £13 per week. Some of these men, but only the minority, saved money.

The machine owners made vast profits, and at this time of the 1300 owners all except eight had been workpeople.

A week's output of a warp lace machine was worth about £60 at this period.

In 1825 there was a disastrous fire at Chard, Somerset, doing damage to the extent of £40,000. The firm, however, re-furnished their mill with up-to-date machinery, and were enabled to cover their fire loss by the profit on the first year's working.

About 1830 the trade was very depressed, and skilled mechanics again took to looking for improvements, with a result that the jacquard was applied in 1835, by means of which beautiful designs were worked into the hitherto plain net, thus opening up new uses for this fabric.

Step by step other improvements were made and motive power employed, and by 1873 a machine was in existence which, after allowing for deductions, could give an annual return of £13,000. These large profits have, except in isolated cases, entirely disappeared in the natural order of modern competition, but the business has resolved itself into a staple trade, and I will deal with the lace factories and their processes as they now exist.

Buildings. Lace factories as a rule are not studies in architectural designs. They are built anything from from one to six or seven stories in height, four stories being the average. They vary in length, but the modern

ones are all the same width, viz., about 45 feet. This width allows the lace machine to stand sideways, with a window at each end, a good light being essential. The buildings have, or should have, a good solid foundation, more especially the storied ones, and it is imperative that they be thoroughly substantial, not only to bear the heavy weight placed upon each floor, but to keep the machine level and rigid, as the slightest defect of this nature will throw the pattern out of register. I heard of one factory where the foundations alone cost something like £10,000 owing to want of judgment in chosing the site. Some of these factories are very big, one of the largest being 378 feet long and five stories high. Others are built one continuous length, but divided into sections by perfect party wall, the wall being anything from two feet six inches to three feet above the roof. The largest of these is at Long Eaton, and is 495 feet long and part four and part five stories high, and divided into six sections. Factories of this construction are usually driven by rope pulleys, the centre division consisting of a rope race (necessitating two party walls), the engine-house being near this point, and usually one storey in height. Factories of this nature require very careful inspection, as the shafting pierces the party wall, and in many cases the opening is not properly made up and is a source of grave danger in carrying a fire from one section to another.

The gearing box is usually at this point, and partly rests in the opening. but at one side of the wall it is always possible to brick the opening up, leaving only a space for the shaft. I am of opinion, looking to the fierceness of a lace factory fire, that one party wall is not sufficient to form a complete cut off, as, apart from the fire spreading through a shafting-hole, the wall will invariably get red hot, and consequently anything of a combustible nature on the other side leaning against the wall would quickly ignite. A single wall of this nature is a doubtful quantity, and has proved so, and I think that in factories of this nature only the rope race should be considered a complete cut off, and limits held accordingly. Occasionally these "section" factories have a lantern roof, and this must always be considered an additional hazard. A fire in January of last year exemplified this. The fire arose from the ground floor of one section, up an inside rope race, cleared a party wall, and attacked the lantern roof of an adjoining section of similar size, which it gutted in a downward progress.

With very few exceptions all lace factories have outside stone

staircases and iron window frames, and it is a very isolated case where you will find an opening through a floor, but a kindred feature of hazard is created where the rope race is run inside the building separated from the room only by means of a timber casing. This is the exception and by no means the rule.

Power. I believe I am correct in stating that this is confined to steam and electricity. I cannot call to mind any factory worked by gas or oil engines. The lace people hitherto seem wedded to steam, as power and heat come from the one source, an advantage which is absent in the case of gas or oil engines.

The boiler is generally in a separate building, but the engine is occasionally on the ground floor of the main risk.

The electric motor in the modern factories is much appreciated, and is stated to work a machine far more evenly than steam.

It has a distinct advantage over steam as a motive power, especially in buildings in plurality of tenure. Supposing a building is let off to ten tenants, and two have plenty of work and eight are working short time. With steam it is necessary for the whole of the shafting and gearing to be moving to give these two the necessary power, involving not only loss of power but possible friction and danger in locked-up rooms. With electric power each tenant has his own motor and his separate shafting and gearing, and consequently it is only necessary for the gear to be in action where the machinery is actually in use.

When inspecting the motor-driven risk it is necessary for the surveyor to pay special attention to the output of the dynamo and the capacity of the motors, and to add to this the energy required for lighting. I inspected a risk recently, and found the capacity of the motors, plus lighting, far exceeded the output of the dynamo, but I might say the motors were not working at their full pressure.

Heating. The heating of lace factory risks generally leaves nothing to be desired, and this fact is verified by there being no reference to an extra in the tariff. They are always heated by exhaust steam, the pipes being sometimes overhead, supported from the ceiling by iron rods, and sometimes near the floor, supported on iron trees. Occasionally you will find a gas stove for boiling water, but I have never seen an ordinary fire-place, and only with one exception a pipe stove, and this was in a part of a factory used by a tin

worker. Owing to the constant supervision by Insurance Surveyors, the pipes are generally kept free from anything of a combustible nature.

The engineer has to pay special attention to the heating of the rooms, this being a very important feature.

The machinery generally runs 20 consecutive hours, *i.e.*, 4 A.M. to midnight, and an equable heat must be maintained, as a marked fall in temperature would contract the delicate parts of a machine, and throw it out of correct working. (There are two men to each machine, working in shifts.)

Lighting. Gas is the general illuminant. It has proved to be a great source of danger. The work is so fine that at times the light is required to be almost in contact with the cotton threads of the fabric. Further, it has to be used in so many different positions that the pendants must be long and contain several elbow joints, which become loose from constant change of position. When tying in the warp (which consists of cotton threads at the back of the machine) a workman sometimes uses a kind of iron stand with gas burner in connection coupled up to a gas bracket or pendant some yards away by means of a length of rubber piping. In one factory, with £200,000 at risk, I saw an operative doing this, and at the same time smoking, the bowl of his pipe being right between the threads of his warp. If you ask an operative about tying his warp in at night, he will tell you it is always done during the day light.

Incandescent electric light is gaining favour, and in some cases this leaves nothing to be desired, but, unfortunately, the remark only applies to single tenure factories, or to manufacturers with large sections of the plurality of tenure risks; but where a tenant has one room for the manufacture of lace as well as the preparatory processes, the lights are fitted in positions suitable for the actual lace machines only. The positions are unsuitable for the warping, winding, beaming, &c., machines, but the landlords have provided each light with a weight pulley and yards of flexible cable, so that the lights can be used anywhere. They are taken to the required position, and supported on the nearest object, sometimes the bar of a lace machine.

With constantly being bent and pulled about these flexibles are bound to be damaged, and, in addition, the wire is very often fixed into the lamp-holder by wood plugs having sharp edges, and this in course of time will cut the wrapping and cause short cir-

cuiting. The result is obvious should this occur when in contact with a lace machine, or steam, gas, or water pipe. Each ceiling rose does, or is supposed to, contain a fuse, and this, of course, would prevent anything of a serious nature if it did its work properly, but, unfortunately, we have that little "if" to contend with, and if "cut outs" and fuses had always done the work entrusted to them, we should not have the disastrous fires caused through electricity

The electric lights used are mostly protected by a wire guard, and as this light is generally fixed about the level of the workman's eyes, and between him and the machine, it is undoubtedly trying, and consequently you will find in many cases the man has fixed a piece of paper on the wire guard on the side of the lamp nearest to him, thus keeping the light from his eyes. The paper is perhaps an inch and a half from the globe, but, of course, concentrates the rays of light and generates heat. It gets very hot, and in course of time becomes carbonised, and in breaking into flame would release itself from the wire guard and flutter down, possibly into the threads of the machine. The light should be provided with an enamelled plate.

In electric light the average lace manufacturer considers he has an ideal means of illumination without any attendant dangers, and when a surveyor goes into the dangers of electric lighting and the chemical action likely to ignite carbonised paper, his efforts are indifferently received.

Processes.

Of course we all know the use of lace is world-wide. Amongst its many uses are the following:—

Lace curtains, lace dresses, ladies' underclothing, frillings, ruffles, blouses, collarettes, handkerchiefs, mosquito netting, bed hangings, pillows, and general embellishments. Rather a new feature, involving the use of a great quantity of lace, is insertions; although blouses and corsets have generally had lace trimmings, this ornamentation is now sewn in the sides and forms part of the actual article. Stockings are now treated in a similar manner.

Dealing with the processes, the silk or cotton comes from the spinning mills in the hank. The ordinary beam and warp cotton costs 6d. to 3s. per lb. and is put on to the winding engine (I might say just an ordinary machine and not an engine at all) and wound on to bobbins and from the bobbins to the beam and warp.

These beams and warps are then ready for placing on the lace machine.

Seeing that I shall refer to the warp and beam later I will describe them.

The warp is a long metal tube with thousands of yards of cotton or silk on it and running the full length of the frame, and the beams are identical except that they are much smaller in diameter. The cotton is not wrapped from end to end of the warp or beam but in very small sections, and each section is threaded and tied on to the work roller as after described.

The cotton for putting on the brass bobbins is of a much finer quality costing 6/4d. per lb. This is also received from the spinning mills in the hank, placed on the winding engine and then wound on to wooden bobbins and then on to the brass bobbins, and these are then placed in the machine.

A bobbin (say 1-25th of an inch thick(will contain 100 yards of cotton. An expert operative known as a "threader" can place 2000 of these bobbins in a carriage in an hour, or put in and thread 1000 in the same time.

While speaking of the preparatory processes I might include the designing and draughting. The designing consists of drawing a nice flower or spray of flowers, or anything you like, and a background or net to match. Anybody who can use a pencil can do this, but the designer must also know what is wanted both for the machine and the market.

After this commences the actual training in this particular department. A paper ruled in small squares, similar to our plan paper, is used, and the actual course each thread takes is clearly defined to make such pattern. This is in many cases done in colours, the different colours showing the quality or strength of the cotton to be used, and from this the worker can read off figures as quickly as another can put them down. From these figures the jacquard card is punched.

The preparatory processes in connection with all lace machines are practically identical, with few exceptions.

We now have everything ready for putting the work on to the machine, but before describing this I will refer briefly to each kind of machine.

The Warp Machine. This is the original machine, and occasionally you will come across one constructed mainly of wood. It works from warp and beam only, no brass bobbins being used.

The Plain Net Machine. This machine works from the warp and brass bobbins. A machine of rather ancient date known as the "Roller Locker" should come under this heading; it makes plain net, but can put a spot on the fabric by means of some metal jacquards.

The Lever's Machine. This is the machine most generally used, as it can be so easily adapted to make almost any class of goods; it is the one most affected by fashion; it works with warp, beams, and brass bobbins; it is usually 176 inches wide and contains 1 warp, 120 to 200 beams, and 3500 brass bobbins. The jacquard in connection with this machine is on the floor at the end of the machine, and is coupled up by metal springs or bars. A machine contains from 100 to 220 of these bars. The warp and beams thread are pulled backwards and forwards by these metal bars, through which they are threaded.

Lace Curtain Machine. This is the largest machine, and works from spools or wooden bobbins and a warp, the latter in this case only being used for strengthening the bobbin thread, and also brass bobbins. The number of brass bobbins in this machine varies considerably, but 4200 is somewhere near the mark. The double curtain machine contains somewhere about 7000 brass bobbins. The jacquard in connection with this machine is invariably fixed to the ceiling; in any case it must be immediately over the centre of the machine. I was in a factory once where the ceiling was low, and consequently they had cut holes in same and the jacquard was on the floor above. I will specially refer to the hazard of this machine later.

Torchon Lace Machines. These are constructed entirely different to any other lace machine, and only make single breadths at one time. The fabric is generally looked upon as hand-made lace and is very expensive. These machines are carefully kept from public inspection, so I do not say too much about them. They are small and circular and work like a compound doubling machine, the rollers or runners being too numerous to mention. They go round and round and in and out, reminding one very much of girls plaiting a ribbon on a May-pole.

Swiss Embroidery Machines. These machines do not manufacture but only put a design on plain net, which is manufactured on the machine already referred to. This class of lace is expensive and used for all classes of decorations on ladies' hats, etc. The collarette so much worn at present is made on this or a similar machine. The majority of collarettes, I believe, come from Plauen. The designs in some cases are worked on this net, and the article is then dipped into some strong chemical and the entire net fabric disappears leaving the design only.

Real Lace Machine. This, I believe, up to the present time is not perfected. I have had the pleasure of seeing it, and could give some few particulars in regard to it, but think it advisable not to do so. It has already cost £12,000. The inventor has the idea of making an exact imitation of the real hand-made lace. It will be very expensive, and it is generally understood that it will not interfere with the ordinary lace industry.

Now, reverting to the commencing or putting on of a pattern, let us take the Lever's machine. When this process has to be done the twist-hands (this is the name the lace machine hand is known by) do not work in shifts but together, and it takes them two days, or say 20 hours. When I state that from the warp and beam and carriage there are 12,000 threads, each one to be dealt with separately and put through holes specially provided and then tied on to the work roller, it would not appear that the hands waste much time. Whilst this is being done the cards are being placed on the jacquard. These cards are long strips of cardboard, each one perforated, but everyone differently. They vary in number according to the motions in the patterns, but always run into the hundreds. They are all laced together. The machine will then commence working, but some alterations are always necessary, and it is wonderful how quickly the men detect where the errors lie. Two or three threads tied up wrongly, or an error in punching the cards, and in the latter case a man will soon fill up the necessary holes (glue being used) and punch out others required, and the machine is very quickly making the pattern in accordance with the design. Altering from one pattern to another takes only about an hour.

It would be most difficult to give details of how the machine works and how the jacquard standing 10 feet away is responsible

for the pattern on the fabric, and I do not think it necessary, but I should be a long time getting tired of watching the numerous and varied movements.

Rates and Conditions.

The all-important question of rates is one that needs no introduction. Apparently the Fire Office Committee first legislated on the lace trade in 1867, with a normal of 5s. with the existing extras (with one or two exceptions), and this rating remained in force till 1892, when the normal was raised to 10s. for storeyed factories only.

Many of the extras for the following items of hazard have been in operation since 1867, whilst others have been included from time to time, viz.:—Defective construction, height, openings, ceilings and wood linings, wooden partitions, lighting, electric motors, steam boilers, plurality of tenure, cardboard box-making, drying and finishing of lace by artificial heat, but the usual extras are height, partitions, and tenure, those being the general features.

The scope of this tariff is confined to the counties of Nottingham, Derby, Leicester, Lincoln, and Rutland, and embraces, in addition to lace factories, risks occupied for other phases of the lace trade.

The divisions required for the ordinary tenant's insurance are:—

Machinery, &c.
Stock, &c.
Jacquard cards, patterns, and designs.

The first and second items are subject to the 75 per cent. condition of average, and the last to the *pro rata* condition of average.

Jacquard cards, patterns, and designs insurances have only been dealt with by recent legislation, it now being necessary to place a separate amount on same. The fact of these for some years past having been included in the machinery item has caused considerable difficulty in settlement.

In years gone by a machine would run for months on one pattern owing to a large order or to repeat orders, but in these days of constant change in fashion large orders for one pattern and repeat orders are seldom given, and, putting it roughly, 75 to 80 per cent. of the jacquard cards, patterns, and designs which have executed the order for which they were prepared are only worth the price of waste cardboard or paper; but in case of loss it

is impossible, even for an expert, to say which will receive repeat orders and which will not, and consequently the Companies have had to pay the price that all these jacquard cards, patterns, and designs actually cost producing.

These remarks you will find confirmed by referring to your lace revisions, and noting the small amounts at which the firms estimate the value of their jacquard cards, patterns, and designs.

Physical Hazard. This in many classes of risk is easy to comment upon, but in lace factories it is extremely difficult, when you consider that no refuse is made. The machinery, which works slowly, is entirely of metal construction, and the buildings are substantial and heated by exhaust steam. Cotton waste is used for cleaning the machinery, and its daily removal is rightly made a point of by Fire Surveyors. Although the used waste looks full of oil, you will find on examination that a great part of it contains no oil, and the other very little, from the fact that black lead is generally used instead of oil. To the casual observer a lace factory would appear to be an ideal risk, but results have proved it to be otherwise.

Let us now recall the reference to the lace curtain machine. As stated, the jacquard must be over the machine, and from this jacquard to the machine, say, anything from 4200 to 7000 strings are connected. The strings are about 14 feet in length. I might also remind you of the long gas pendants and loose elbow joints.

It is necessary for the jacquard to be well lubricated, with a a consequence that in course of time a fair quantity of oil drops on to these strings. Sometimes you will find a piece of paper lying on the strings to catch any oil, as a softening of any of the strings causes expansion and looseness in the work. This is very dangerous, as in course of time the paper gets saturated. I objected to this in one case, and asbestos was suggested, but in experimenting with same I found the oil on the asbestos would burn very fiercely until consumed, leaving the asbestos itself intact. These strings do the same work as the metal bars in a Lever's machine. In times gone by these strings have proved highly dangerous, and I could mention three cases where the gas light coming in contact with the strings has resulted in disastrous losses. Some manufacturers have recognised this danger, and reduced it as far as possible—the strings are always at the back of the machine, and by turning the machines back to back,

and allowing no light in this alley, have made it impossible for the strings to come in contact with the gas pendants.

It would be as well to point out that in case of these strings catching fire the flames rush up to the ceiling and consume the jacquard cards, and this is sufficient not only to burn through the floor, but to extend the flame along the ceiling and attack strings of other machines on either side. This fire being at the ceiling level, 15 or 18 feet high, buckets are useless, and by the time a hand pump (if there is one) is got to work the fire is beyond the control of such primitive appliances.

I distinctly remember four fires starting during working hours; three starting from lace curtain machines owing to a gas jet coming in contact with the strings, resulting in gutting the buildings in all cases, and the other through a belt breaking and knocking a gas jet into a Lever's machine (but this was stopped in the room it started in). The remainder I believe have started when work has ceased, and frequently on Saturdays, 10 or 12 hours after the premises have been closed.

Old factories, not being wide enough, are unsuited to modern machines, consequently when these are introduced a portion of the window has to be removed and a wooden box fitted on the outside, into which the spring frame (a small section of the machine) extends. These boxes are often used as receptacles for lunch papers, waste, &c. In "section" factories, given a perfect party wall good enough for its work, these boxes might serve to carry a fire externally from section to section. Further, the floors in old factories were not made to carry the weight of a modern machine.

There are three factories fireproof or partly fireproof, but these are old, with iron girders exposed, and not at all in accord with the present idea of fire-resisting buildings.

As a general rule, owing to the limited quantity of oil used, the floors do not get saturated with this liquid, and it is an exception to the rule to find any great quantity of lace or yarn in a factory, and owing to the extra for timber partitions the majority have been removed and corrugated iron substituted; and still, with practically only the floors and a small quantity of lace and yarn and jacquards, it is surprising how fiercely these factories burn, the result, as a rule, being a complete wreck of the building. The fall of a lace machine through a floor weakened by fire creates a large well-hole, thus giving a fire complete hold of the

building. I cannot call to mind any "stop" when once a floor or a portion of a floor has given way.

Lever's machines and jacquard frame will weigh 10 tons, and a curtain machine about 11 tons, and as many of these factories contain 15 to 20 on each floor, it is easily seen that a floor weakened by fire must give way under this weight.

Again, a serious fire in a lace factory means a disastrous loss to Insurance Companies.

Take a factory four storeys high containing 20 lace machines on each floor. These machines would average £700 each, and add to this the machines for preparatory processes, also the building and the stock, you have a £70,000 to £80,000 loss, and the premiums derived from this class are insufficient to meet many such losses.

Of recent years, owing to disastrous fires and the difficulty of getting insurances on the large plurality of tenure factories, there have been several new ones erected, mainly of one storey.

One of these new factories is one storey in height, in several blocks, and these blocks divided into sections by perfect party wall, each being occupied by one tenant. This factory is lighted and driven by electricity. Another is of three stories, lighted by electricity and sprinklered. I might say that, generally speaking, the lace manufacturer and the lace operative are very fond of life, and consequently a depression in the trade is very quickly felt.

Apart from the dangerous points raised and the scope of a fire when one occurs, I consider there is very little inherent danger in the trade; still numerous fires have occurred, but mostly when trade was bad.

Appliances. This question is one which has more interest to the Insured from a discount point of view than for the Offices from a protection point of view.

It would be difficult to find a factory with no fire extinguishing appliances, and these vary from the orthodox six buckets to each 500 square yards, etc., to and including the automatic sprinkler. With the exception of the sprinklers, appliances are always a very doubtful quantity (except possibly in single tenure factories), owing to the fact that the landlord supplies them, and they are under the control of the engineer. Nobody else takes the slightest interest, and would have no idea of using them in case of fire. The buckets on the upper floors are very often empty, and there being no water taps on many landings the buckets are used for washing and other purposes. Plurality of tenure factories are

very difficult to manage for this reason. A tenant on the top floor says if there were a tap on his landing he would keep his buckets full. With him it means going down and up five flights of steps, whereas the tenant on the ground floor has only to go to the tap in the yard. In some cases this argument has been considered reasonable, and taps supplied on each landing. Next week tea leaves and other refuse are thrown into the basin, the openings filled, the tap left running, and the staircase, landings, and possibly the ground floor, are flooded. Consequently the taps are promptly removed.

The "printer's devil," who has a reputation peculiarly his own, cuts a very sorry figure at the side of the average boy in a lace factory. I complained to an engineer that a room contained an excess of oily waste and that the buckets were empty. He said—"In that room there is a boy engaged for these purposes alone, and he is the worst boy in the factory." After a good deal of looking for he was found on a waste piece of ground near playing football. He heard what I had to say, and then quietly returned to the game. In some cases the engineer has a fixed responsibility for the buckets, and in these cases they are mostly in order. The automatic sprinkler is undoubtedly a great advantage, as rooms in a lace factory are so arranged as to give a sprinkler full play. These sprinklers have never, I believe, been tested in this class of trade, but I should have every confidence in their putting a fire out; still I am afraid that a sprinkler opening would cause a considerable amount of water damage to the delicate parts of a lace machine. As there is always a possibility of a sprinkler head being damaged or knocked off, I make a point of suggesting that each tenant should provide himself with a large tun-dish or funnel with the spout long enough to reach from any of the sprinklers out of a window. This tun-dish to be covered at the top with a substantial piece of rubber, cut in the centre like a hot cross bun. In case of accident the damaged head can then be forced through the rubber and the spout put through the window, thus preventing serious water damage.

In regard to buckets, it is perhaps not generally known that a handful of common soda placed in each keeps the water sweet, and at the same time this liquid can be thrown on a machine without rust resulting.

Broadly, I have very little faith in lace factory appliances, excepting sprinklers.

Record of Fires. I will now refer to the losses which have occurred in lace factories during the last 22 years, no definite cause being assigned to any except as previously stated. I only include those of a disastrous nature. Actual settlement figures proved difficult to obtain, consequently the figures are approximate.

1881	one fire	£50,000
1884	one fire	80,000
1886	one fire	50,000
1888	one fire	60,000
1890	seven fires	217,000
1891	two fires	70,000
1893	one fire	20,000
1894	one fire	35,000
1901	one fire	20,000
1902	two fires	124,000
		£726,000

This table, from the small number of fires, seems to point to a minimum of inherent hazard from a process point of view. It will be noticed that the fires are not numerous (18 over a period of 22 years), but the effect of these on the Companies trading is manifest from the heavy value which each fire has consumed. In view of the money disbursed by the Offices, it is not surprising to find that many no longer write the class, and those who continue will only accept moderate lines.

The lace Insured have often criticised the ratings and conditions adopted by the Companies, but with the loss experience to face, these ratings and conditions must be regarded as quite justified and by no means over stringent.

W. H. MARYAN.

Birmingham Insurance Institute,
April 3, 1903.

BRUSH FACTORIES.

WITHIN the compass of a short paper I must necessarily be brief to some extent in the introductory remarks leading to my subject. I cannot say when the making of brushes first began, as its infancy is hidden in the unknown distance of the past, but a considerable antiquity can be claimed for it.

It is the Painter's high vocation to give light and life to the naked scene around him, and whilst adding beauty thereto, his work is of a highly preservative as well as decorative nature, as the saving quality of linseed oil and white lead are well known to the prudent property owner. His tools are brushes, and there is perhaps no utensil in such common and constant use, in its various forms. A variety of substances are used in their manufacture. What they consist of, and how made up, we are about to investigate.

The Brush trade appears to the outsider to be a very simple one, yet it has its complexity, as brushes vary in quality to such an extent that experts only can determine their relative value. Quality is, however, an indispensable essential in the supply of tools; therefore, as the more expensive bristles are put into the better class brushes, the user willingly pays the higher price, knowing that the brush will last longer, and better work be the result.

Bristles.

Bristles form by far the chief article in the manufacture of brushes, and the consumption is so vast as to form a very important commerce in this article. They are gathered from all quarters of the globe, coming chiefly from Russia, Siberia, and China, although those from Siberia are recognised as superior in quality, and it was here, in former times, that the peasants simply went into the forests and gathered the bristles shed by the wild boars. Now, however, each village possesses a herd of boars in common, and at the season of shedding the villagers drive the animals into an enclosure, and assist the work of nature in a more or less severe fashion. By this means a larger harvest is secured, and less

trouble involved in doing so. Many villages are said to subsist on the bristle harvest alone.

It may not be uninteresting to mention here that an important duty was imposed, ranging from 2s. 6d. per cwt. on rough, to 3s. per cwt. on sorted bristles, but this was discontinued in 1845.

The bristles, as gathered, are of various colours intermixed, and before being used, and sometimes before being imported, they are sorted into Black, Grey, Yellow, White, and Lilies, the last variety being so called on account of its silvery white appearance, it is chiefly used for shaving brushes, tooth brushes, and the softer class of hair brushes. The black bristles come chiefly from China. They are then classified according to length, the longest being dexterously extracted, as uniformity of size and quality must be carefully observed.

Bass.

Bass consists of a coarse brown coloured fibre, which constitutes a portion of the Piassava fibre of commerce; it is obtained from the base of the palm which grows in forests in the Brazilian Province of Bahia, and when cut away by the natives is in the form of unopened leaves, after which it is roughly dressed for the market. I may here remark that this fibre was originally used by the natives for making cordage, but after its adaptability for brushmaking was discovered it was imported to Europe for that purpose. On arrival here, the finer qualities, viz., "Para" and "Bassine," undergo a course of preparation, which consists of steaming, dyeing (in steam-heated vats), as unripeness or dissimilarity in colour has to be avoided. Drying follows, after which it is sorted, and as it is long in the staple it is cut into requisite lengths. This is usually employed in making scrubbers and the like, whilst the coarser and stronger kinds are destined for street and stable use.

Mexican Fibre.

As an inexpensive substitute for bristles, the softer variety of Mexican Fibre is used, which consists of the stalk part or veins of leaves. After being prepared it becomes white or tinged with green or yellow, and has a variable length of staple up to 40 inches. Sorted into "longs" and "shorts" by means of inverted combs, which consist of needles pushed through a piece of wood fixed to the bench, the dresser strikes a double handful of fibre thereon, and draws rapidly towards him until the fibre assumes the appearance of a horse tail, the shorter lengths being retained by the comb. This is the process known as Hand Heckling in Flax and Jute Mills.

Cutting to the required lengths by means of a guillotine follows, after which it is ready for the brushmaker.

Other Substances.

Cocoa Fibre, or the husk of the cocoanut, is largely used, as after being crushed and combed to properly separate it, it is ready for use. Horse hair is also used, but, owing to its adaptability for so many other purposes, it stands at an enhanced price, and is therefore only met with in a minor degree.

The camel, badger, squirrel, and goat supply the hair for the artist's pencil. Whisk is chiefly employed for carpet brooms, it is a light-coloured vegetable fibre obtained from France and Italy. Whalebone is employed for hard brushes. It is boiled or steeped in water until it becomes soft and flexible, so as to admit of being cut into shavings, which are split and dried, and used in the same manner as natural bristles. Hair seating is sometimes brought in and teazed, but, owing to the bend or curl which it has acquired, it is not regarded as altogether desirable in brushmaking, and is therefore not in great demand.

Wood Working Machines.

Thus far, we have only dealt with the brush constituents. We will now proceed to the "stock" or "back." In brush factories you may always expect to find boring machines, band and circular saws, and sand papering machines, these being kept, however, for preparing and finishing purposes, as it is the exception and certainly not the rule, to find these wooden accessories made on the premises, as they are either imported or made at the local wood turneries, although it is perfectly well known, of course, that in very large factories the wood enters in the shape of trees, and it is delivered as brushes; therefore, the saw mill element is largely introduced into risks of this class.

Boring is the first process necessary, and this is done by means of a "bit" fixed into the turning lathe, against which the worker holds the "back" and drills each hole separately. In fully equipped factories, however, machines have been introduced which can drill all the holes simultaneously, the output from which, and the saving of time, is enormous. For "wire drawn" brushes the holes must be bored entirely through the board.

Brushmaking.

This brings us to the actual brushmaking. We will take the paint brush first. The operative ties up sufficient bristles for one brush, *i.e.*, assuming they are already sorted. If not so, he must

classify them as already indicated. and then tie them together, a by no means simple performance, as to the uninitiated the bristles would be pointing in all directions, as they are never straight in themselves, but have a natural bend, and it is to make this bend turn inwards that the cunning in the hand of the workman shows itself; and the necessity for this arrangement is readily seen, as it makes the brush more compact, more elastic, and more pointed. The bristles being then tied, the root end, which is perfectly flat, is dipped into cement, consisting of resin and raw linseed oil, kept liquid by means of a bunsen burner, and then stuck on to the handle or into the handle socket, as the case may be, to be then securely fixed by means of strong twine, wire, or ferrule, according to the shape or style of the brush. They are then washed and placed in a bleaching chamber, where sulphur fumes are applied, by means of a red-hot bolt firing an ounce or two of sulphur, after which they enter the drying stove, where the heat quickly hardens them.

We will now take the "wire drawn" brush, which applies to those of the hair, cloth, boot, and scrubbing class. When hand drawn, the operative passes a loop of thin flexible wire through the back of the board, the holes being through and through, as already mentioned, and then slips a bunch of the material sufficent to fill the hole into the loop and draws it in, which act doubles the bunch in two, so that both the loose ends form one knot or tuft. The wire is then passed into the next hole to receive another bunch. This is repeated until all the holes are filled, when the wire is fastened.

In factories where the output is exceptionally large, the "filling" is done by machinery, which almost entirely dispenses with "hand drawing" or "wiring." It can be said for this machine that it is a wonderful invention, as by a curious piece of mechanism it places sufficient hair or fibre to form a tuft on to a toothed travelling belt, from which it is picked up, doubled, and driven home by a "plunger," which at the same time forces down a scrap of flat steel, fed from a coil alongside, which, when in position, spreads out and firmly holds in the tuft. The only assistance this machine requires is for the wood back to be held in position, so that the "plunger" can accurately hit the holes successively.

Tooth and nail brushes, from their small size and greater neatness, form a distinct branch of the work. In them the bristles are drawn with very fine wire sunk in narrow grooves in the back,

which are afterwards filled in with red cement. The best sort are, however, "trepanned," the holes not being bored entirely through, but only partly so. These are met by cross channels bored in either from the end or from the side, through which the wires are drawn and completed by the small lateral holes being plugged with pieces of bone or ivory.

Pitch Pan Department. We have now arrived at the last class I intend referring to, viz., the Broom or Sweeping Brush, as it is with these the use of Pitch is employed. The operatives sit round a circular table, in the centre of which, and raised above its level, is a sub-divided pitch melting pan, with a bunsen burner below. The pitch arrives solid, and is broken up into small pieces to facilitate its rapid melting. As drips are liable to fall on the table, it is usually kept covered with whiting to absorb them, and also that clean work may ensue. Each man has a quantity of "bass" or fibre on the table, from which he extracts sufficent to make a "knot" or "tuft;" these he strikes on the board until they are even and regular, then, grasping them tightly, he dips them into the pitch, next quickly binding them with a thrum round the pitched ends, re-dips this and inserts it with a half turn into the hole in the "back," and repeats the process until the completed brush is produced.

Finishing. Wire drawn brushes must have a top to hide the wires from view. These are glued on and held together by screws or clamps until set, after which they are reduced to shape by the Band Saw, which does its work so neatly and completely that only a little trimming is required with the spokeshave. They are then smoothed on the sand papering machine, which consists of a rapidly revolving cylinder covered with sand paper. When grooved or recessed backs, or side finger grips are required, the gouge is brought into requisition for the purpose. In those brushes requiring an evenness of surface, the material is trimmed or levelled by a pair of shears, or by rapidly revolving power-driven knives. To give certain brushes a complete and finished appearance, some are French polished, others get a coat of varnish. This is usually done in the warehouse, where a supply of these compositions are kept in proportion to the output.

Observations. We have requirements which apply more or less in a general way to all risks, but the following amongst others are most conspicuous in the class before us, and therefore call for our closest attention.

Cleanliness should be well observed, more particularly in the wood working, sorting, and dressing department. Many factories provide bags to receive the "borings" from the turning lathes, others simply allow them to fall on the floor until they rise almost the height of the lathe. Objection should be taken to this latter method. Sand papering machines are usually provided with a metal conduit, having a fan blast attached to draw off the dust to a chamber or receptacle. It is no uncommon thing, however, to find these machines without blasts, in which case they are usually fixed close to the wall, timber, or otherwise, against which the dust discharges itself to fall on the floor, or adhere to the immediate surroundings, which is most objectionable, and where such is found to be in use no naked lights should be allowed in proximity thereto.

As regards drying-rooms, the prevailing practice seems to have been, and unfortunately in some instances still prevails, to erect a timber partitioned-off compartment or compartments, and fix a slow combustion stove in the centre, having, of course, the maximum of smoke pipe therein; steam pipes are, however, largely in use, often fed direct from the boiler, in view of which, and seeing the timber compartment still exists, these rooms require the closest inspection. It is, nevertheless, a decided objection to have them in the main building, as, apart from their flimsy construction and highly combustible contents, they are a constant menace. Some manufacturers recognise this, and have erected fire-proof buildings standing detached, in which this portion of the work is done.

The pipe conveying the gas to the pitch pans should receive particular attention. It should always be of metal, and fixed for preference against the table leg, although it will often be found standing by itself in the centre, but when you consider the movements of several pair of feet below the table, the less exposed it is the better. Under no circumstances should rubber tubing be allowed for this purpose. I am quoting you no mythical case when I say that one of this class recently came under my observation.

I should like to make a closing reference to the gas lights in warehouses. The goods in these are arranged in bins, according to the class and quality, and they rise from floor to ceiling with a narrow path between each. Against this framework brackets are fixed, or else pendants from the ceiling, therefore it is most desirble to see that these are fixed and immovable.

Fires. The procuration of reliable data as to the experience of offices on certain classes of risk is not always easy of attainment, and it has proved so in this case. There may, however, be some satisfaction in knowing that amongst the fires which occurred during the last ten years, two or three only were occasioned by the boiling over of pitch, one to the overheating of "bass," and quite a number from "sparks" and "hot ashes," while the "unknown" bulges largely as usual.

Undernoted are a few risks where damage to the extent of about £1000 and upwards was sustained:—

Name.	Situation.	Date of Fire.	Approx. Damage.	Cause.
E. W. & W. Greenslades.	Thomson St., Bristol.	...	...	Serious, but no particulars
T. Mears.	Fishergate, Preston.	Nov. 26, 1890	£3000	Unknown.
E. Benson.	Fazeley St., Birmingham	Jan. 27, 1894	£1250	Unknown.
J. Woodman & Co.	St. Paul's Square, Birmingham	Jan. 12, 1895	£1000	Unknown.
J. Ferguson & Co.	York St., Glasgow.	June 14, 1895	£1350	Unknown.
A. H. Hunt.	Scholes St., Manchester.	Jan. 16, 1897	£1550	Light falling on Stock.
Clarke & Sons.	Walsall.	Sept. 23, 1899	£4300	Unknown.

D. C. CAMPBELL.

Insurance Institute of Newcastle,
February 27, 1903.

JUTE WORKS.

The Jute Plant and its Cultivation.

THE jute plant is an annual which grows from about 5 feet to about 12 feet high and of an average diameter of about three quarters of an inch. The material treated in jute mills is the fibre belonging to this plant. Jute belongs to the Corchorus family of plants, and the botanical names of the two species from which our fibre is principally obtained are Corchorus Capsularis and Corchorus Olitorus. Jute is chiefly cultivated in the deltas of the Ganges and Brahmapootra, in which part of the world the humid atmosphere and cheap and plentiful labour provide the most advantageous conditions. Other parts of the world, such as America, Mexico, and Egypt, have been able to produce jute, but these countries do not yet cultivate to any extent. In order to grow jute successfully, the ground has to be ploughed before sowing; and the Indian ryot has much to be thankful for that Nature does not despise the primitive scratchings which he calls by that laborious name. One can plough about March or April and expect to reap by August or September. The best soil is alluvial deposit. When the shoots of the plant are about a foot and a half high they are thinned out to about six inches apart and left to flower, and, when flowered, are ready for cutting. For this purpose the native with a sickle-like knife in his hand severs the plants close by the root, an armful at a time. Then comes the process of "retting" or steeping in water in order to soften and remove the fibre. "Retting" takes from ten to twenty days as a rule. Experimenters state that running water is to be preferred to stagnant water for perfect "retting," but the native prefers stagnant water, as he has in most cases only to dig a hole in the moist ground to get a steeping tank ready made. From an Insurance point of view, it is probable that stagnant water is best, because there is less chance of the jute being impregnated with sand, which, in the fibre, is dangerous in the mill owing to friction among the machinery. When jute has been "retted"

enough the fibre is stripped off the stems by the "beater," as he is called, who stands down in the water and beats the stems with a mallet. When he has detached the fibre, he rings it out in the water and hangs it up on a bamboo rail to dry, after which it is ready for the local market. The Government of India have made some experiments in jute growing, and have tried machinery for "beating," but the natives apparently do not take kindly to innovations. Their customs are things which alter not.

The local market is known as a "hat," and the jute fibre is taken thither in small bundles weighing about 10 lbs. When the material leaves the local market it is done up in drums or rolls of about 82½ lbs., which are floated down to Calcutta on "flats" or rafts with a corrugated iron roof over them, and so they reach the baling agencies. At the baling agencies the bales for export are made up, the material being pressed by powerful presses into bales measuring about 48 inches by 18 inches by 20 to 21 inches, and weighing about 400 lbs. The material is very firmly pressed, and the bales are bound round with ropes, but are not packed in any covering. The firm pressing of the jute bale is an important thing from the point of view of its combustibility, which is greatly retarded thereby.

Note on the Chemical Composition of Jute.

Jute, like all other vegetable fibres, has for its chief constituent cellulose, which is a compound of carbon, hydrogen, and oxygen, having in the pure state the formula $C_6 H_{10} 0_5$. This cellulose, associated with very small quantities of other organic matter, forms the fibres, and there is always present a cement substance which binds the fibres together, but its constitution, because of the impossibility of obtaining it pure, is unknown. The following analyses of different samples of jute indicate the general composition of the plant. With reference to the ash, it is certain that its composition would vary in plants grown in different soils. Like other vegetable matters jute is liable to oxidation and consequent heating if packed in a damp state. It does not appear to be quite certain, however, that oxidation has ever raised the temperature to ignition point and produced fire spontaneously. This is a point of great importance. In an atmosphere saturated at the ordinary temperature jute takes up 23 per cent. of moisture.

The inorganic constituents of jute form from about 0·8 per

cent. to about 2·0 per cent. of the whole, and chiefly consist of silica, phosphate of lime, and sometimes a little manganese.

ANALYSES OF JUTE BY HUGO MÜLLER.

	LONG FIBRE.		
	NEARLY COLOURLESS.	FAWN COLOURED.	BROWN CUTTINGS.
Ash	·68	–	–
Water	9·93	9·64	12·58
Aqueous Extract	1·03	1·63	3·94
Fat and Wax	·39	·32	·45
Cellulose	64·24	63·05	61·74
Incrusting Substances and Pectic Constituents – difference from 100	23·73	25·36	21·29

It may be mentioned that the ultimate fibre of jute is very short. On that account, and possibly on account of the special nature of the cement substance binding the fibres, jute is a brittle fibre and requires to be treated with oil before being worked in the mill as hereafter described.

THE JUTE MILL.

Describing the Processes and Illustrating the Machines.

Bale-Opening. Bale-opening is the first process in the mill, and it is either done by tearing up the bales or breaking them up with a steam hammer with or

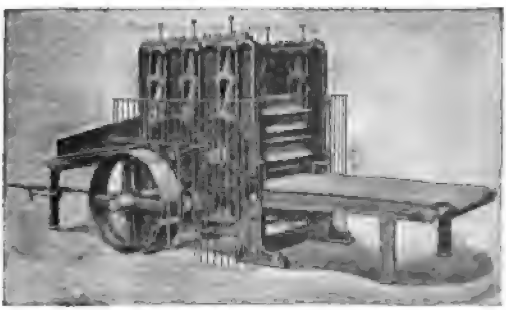


FIG. 1
BALE-OPENER.

without the aid of a "bale-opener" (Fig. 1) to follow. The "bale-opener" has three heavy upper rollers working on three similar lower rollers, and crushes out the lumps of jute into what are called "striks."

Selection. This is merely sorting out the "striks" into their various qualities of jute, as bales are not always entirely of one quality. In some mills the practice is to lay the selected "striks" into batching stalls ready to be taken to the softeners as required. You will appreciate that, although there is no hazard in "selection" as a process, the amount of material lying in the department might lead to a considerable conflagration if fire got a start there.

Batching. Batching may be of two kinds, namely, softening or machine batching and hand batching. Hand batching is hardly known to be done in Dundee.

Hand Batching. In the case of hand batching, the "batch" is spread in a thin layer on the bottom of a batching stall, which is a rectangular box of about 15 feet by 4 feet by 6 feet, and one worker pours oil on the layer and then another pours on water, and a similar process is carried on with other layers till the stall is full, when the whole is tramped down to press the oil and water thoroughly through, which is essential for good batching, and the material is then set aside to get into condition. Hand batching is less desirable from an Insurance point of view than machine batching, as the material may have to lie as long as 36 hours to get into condition for carding, and it is not impossible that the fire fiend might step among the stalls and find some expensive work for the oily jute to do.

Machine Batching or Softening. This is the usual process in jute mills, and it is a most important process, as jute, as already stated, is of such a nature that it cannot be worked without being oiled first. The Softener (Fig. 2) consists of from 20 to 60 pairs of fluted rollers working on a low iron frame. The rollers lie parallel to one another pair by pair, but, in order that the material may be kept spread over the whole breadth of the machine and not choke it by being bunched up in the middle, the rollers are fluted spirally. The jute is fed in on a feeding cloth, and the first few rollers merely mangle it and help to shake out any sand, &c.; but a little farther on water is dropped on it from an automatic apparatus, and after a little more mangling oil is similarly put on, and it finally flows out of the

machine cleaned, watered, and oiled, and with both water and oil properly squeezed through. The softeners are allowed to be worked some time in advance of the carding engines so as to keep

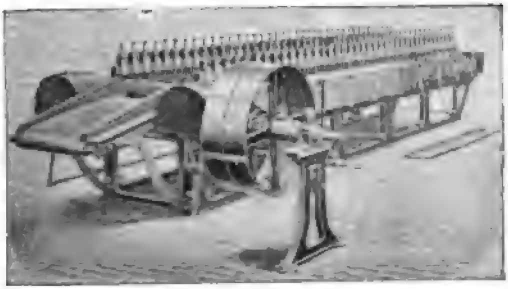


FIG. 2.
SOFTENER.

the mill going, but the jute does not require to lie so long in order to get into condition as in the case of hand-batched jute. The speed of the rollers of the softener is not great, being only about 35 to 40 revolutions a minute. The floor of the softening room should be of stone flags, as a wooden floor would be in danger of becoming soaked with oil. The softener should be provided in all cases with pans below to catch and run off the oil to prevent its falling on the floor.

Note on Batching Oils.

The principal oils used are :—

Fish oil, such as whale and seal oil.
Vegetable oil, such as linseed, &c., oil.
Mineral oil, such as Broxburn, or similar high boiling oil.

In every case where I have ascertained the exact batching oil used, it has been either a mixture of fish oil and mineral oil or mineral oil alone. Fish oil binds the fibre best together and gives the most pliant yarn, but it costs about £20 a ton, whereas mineral oil can be had for about £8 a ton. Mineral oil is used as much as possible, but cannot by itself be used for the finer yarns. The exact mixtures of oils for batching differ in different mills, as each uses the one most suitable—a first-class batching mixture is two-thirds fish oil and one-third mineral oil. In many cases mineral oil alone is used when it is satisfactory for the purpose. Fish or vegetable oil used alone would be too thick, and the sliver would lap and clog the machines. Instead of using the natural

oil, fish or vegetable oil may be saponified with an alkali or mixed with soap into an emulsion if the yarn is to be bleached, as that treatment overcomes the difficulty the bleacher would otherwise find in removing the oil from the yarn. The amount of oil and water needed to batch jute depends upon the nature of the particular sample, the kind of batching mixture, and the moisture in the air, as only such quantity is required as will make the jute work over the machines with the least waste and best effect. You are aware that certain oils are hazardous from the point of view of spontaneous combustion, but mineral oil, being composed of simple hydrocarbons alone, is not liable to spontaneous combustion. Its mixture with an oil liable to spontaneous combustion makes the mixture less liable to that hazard.

High boiling mineral lubricating oil is the kind of mineral oil used in batching. Scotch, American, and Russian mineral oils can all be used. These are all hydrocarbon oils of similar, though not identical, chemical constitution. Generally speaking, the American and Russian oils have a somewhat lower flash point than Scotch oil of the same specific gravity. The flash point of the Scotch oils used is about 353° F. and upwards.

It is stated by chemists writing on the fire hazard of oils used in manufacturing risks, that the lowest flash point which should be allowed is 340° F. According to that limit, it would appear that the above oils are safe as regards flash point.

The danger of using an oil with a low flash point is, that if the temperature in the mill at any time reached the flash point of the oil, the latter would begin to give off an inflammable vapour.

Rosin oil may be sometimes used for batching purposes. This oil is obtained by the distillation of rosin, and its best grade has a pale-yellow lemon tint. The best grade of rosin oil will probably not flash below 350° F., but the lower grades will flash below that.

None of the animal or vegetable oils flash below 340° F.; and as mineral oil with a safe flash point can easily be obtained, the use of a low flashing mineral oil cannot be looked on with favour.

The fire hazard of animal and vegetable oils does not consist in their flash point being low, but in their liability to heat by oxidation and cause spontaneous combustion.

Teasing. The "Teaser" is a machine used for reducing jute cuttings, threads, ropes, and suchlike to the light and open state of "tow" suitable for carding, and consists of a drum set with strong teeth working

on a roller and a shell, or on two other rollers, with a speed of about 200 revolutions a minute. The "teaser" makes a good deal of dust, and is usually enclosed in a metal case. You can usually judge when teasing is done that inferior material is being used, but it does not follow that the risk should be condemned on that account, as the mill may be a large one doing a trade in all classes of goods, but the presence of "teasing" might be a clue to the class of risk if taken along with other things. The surveyor ought to note the condition of the tariff regarding teasing, namely, that any machine for reducing ropes, &c., and which delivers materials in any form other than sliver weighed and sized for spinning, is a "teaser" within the meaning of the tariff, and requires the charge for teasing to be made. The reason why teasing is not so common now as it used to be is that jute was at first worked over flax-preparing systems which were not strong enough to stand the coarser fibre of jute, and so jute had to be first converted into "tow" and then carded. Nowadays the "breaker" card acts directly on the jute fibre.

Carding. Jute is usually carded twice, first on the breaker and then on the finisher card. Both machines do practically the same work, only the finisher performs somewhat finer work than the breaker. For a view of a "breaker" and a "finisher" carding machine see Figs. 3 and 4. The rollers of these machines, you will see from Fig. 5, are all clothed with pins. The object of carding is to comb out the fibres so that they lie straight; and the "striks" as they come from the softeners are fed into the "breaker" card by means of a creeping sheet or feeding cloth—a stated weight in a given time, according to the weight of yarn to be made, the operative having to watch a dial and pointer attached to the machine and put through so much for each round of the "clock," as it is called. To enable me better to explain the working of the carding machine, kindly refer to the sectional view of the breaker card (Fig. 5). When a "strik" of jute is fed in, it is caught between the pins of the feeding roller "B" and the "shell" "C." The "shell" performs the function of retaining the jute against the pins of the feeding roller, which retard it as it passes through, while at the same time it is combed by the pins on the cylinder. The cylinder then carries the fibre round till it meets the worker "E." The "stripper" "D" cannot do anything to the fibre, because it has its pins all set forward. Between the "worker" and the cylinder

the jute is combed, and it is supposed that the finer part of it remains on the cylinder while the heavier and insufficiently carded portion is raised by the pins of the "worker," which carries it round itself till it meets the "stripper" "D." The stripper, therefore, strips the worker and sends the material back again to the cylinder for more carding, till it is sufficiently light to remain on the cylinder. At least that is what is supposed to happen on the carding machine. Rollers "D^1" and "E^1" are another stripper and worker, and "F" is called the "doffer," because the fibre is taken off there and passed between the drawing roller "G" and the pressing roller "H," where the faster speed of "G" draws it out in length and delivers it into the "sliver" cans in the form of "sliver," weighed and sized—that is, of a certain weight and size. You will notice from my description that some of the rollers travel at different speeds. The effect of this is to give what is known as a "draft," that is, to lengthen the material out. We might usually look for the "breaker" having a draft of 12 to 15 and the "finisher" a draft of 16 to 22. In other words, the "breaker" will deliver 12 to 15 units of length for every unit fed in, and the "finisher" 16 to 22 units. The speed of a carding machine varies in different mills, but we may say that the average speed of the cylinder (whose average diameter will be four feet) is from 180 to 200 revolutions a minute.

Balling. Between the "breaker" and the "finisher" card the sliver is sometimes wound into balls or rolls before being fed into the "finisher" card. This process is called "balling." It is not always done, as the alternative process is to feed the "finisher" card from the sliver cans. In some mills it is done, as it is found a convenient way, to weigh the sliver produced. So much length goes on each ball, and after the ball has been weighed one can tell the quality of the sliver.

Drawing. The process following the "finisher" card is "drawing," which is performed on the drawing frame (Fig. 6). The object of "drawing" is to obtain an equal sliver, and finally an equal yarn therefrom, and the machines are so arranged that the chances on an average are as much as 160 to one against a thin part coming next a thick part by the time the sliver has been drawn the second time. The first drawing frame may have 4 to 5 of a draft and the second 5 to 6 of a draft. The drawing frames commonly in use are the "chain" or the "push-bar" drawing frame. The "sliver" is fed from the

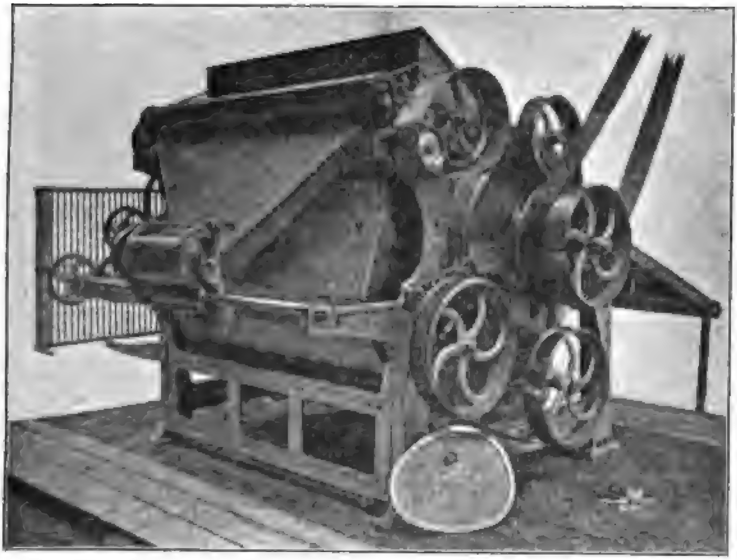


FIG 3.
BREAKER CARD.

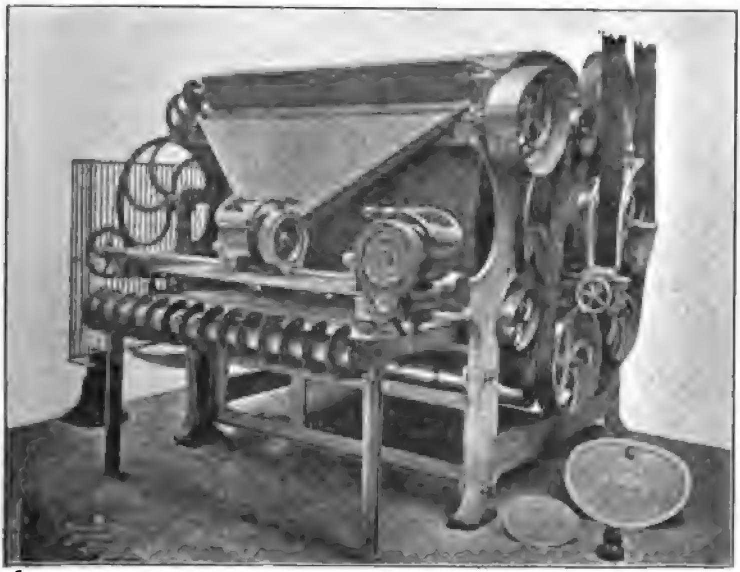


FIG. 4.
FINISHER CARD.

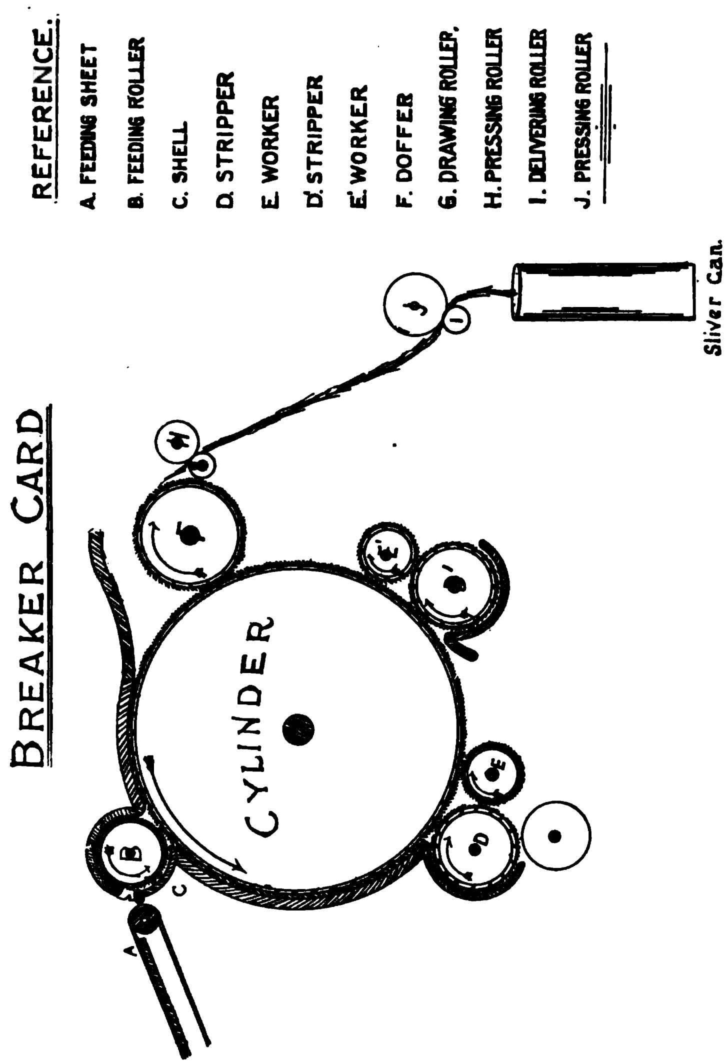


FIG. 5.
SECTIONAL VIEW OF BREAKER CARD.

sliver cans to a steel feeding roller, which carries it to a number of bars, an arrangement which may be described as an endless chain, each bar being closely filled with upright pins or "gills."

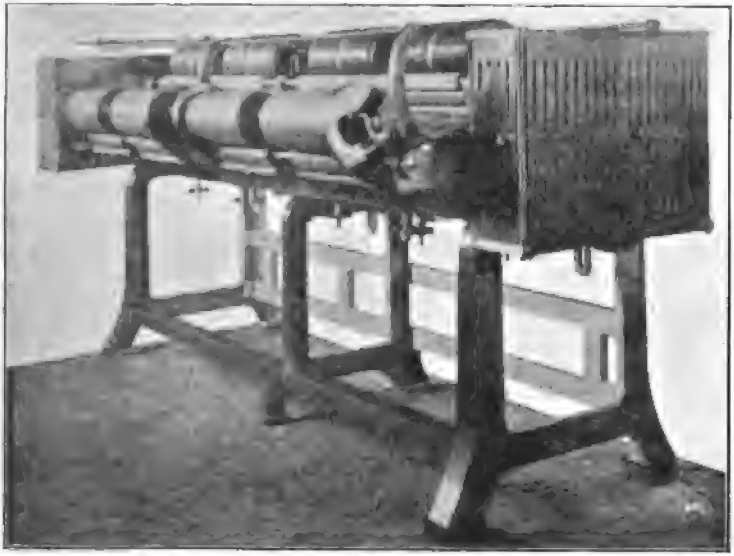


FIG. 6.
DRAWING FRAME.

This circumference of "gilled" bars revolves away from the feeding roller, and a little faster than it, and so combs out the sliver, and this is further aided when the sliver reaches the drawing roller, which is going faster still, with a leather pressing roller resting on it and keeping the sliver fairly tight. In the drawing frame a number of ends, four, for instance, are united into one, and so the material gradually becomes something like yarn.

Roving. The next process is roving, where the sliver gets its first twist, at the end of which it ceases to be sliver and becomes "rove." The material is fed into the roving frame (Fig. 7) much in the same way as into the drawing frame, and gets, on the average, a draft of 7 to 9, and is also combed as on the drawing frame. But the ends are all treated separately on the roving frame, and are twisted by a spindle and "flyer," receiving about three-quarters of a turn to

the inch, afterwards being wound on to the rove bobbins. It is on this machine the differential motion is used whereby the speed of the bobbin is made to decrease as its diameter (caused by the "rove" winding on) increases, so that the "rove" is saved the strain which otherwise would break it.

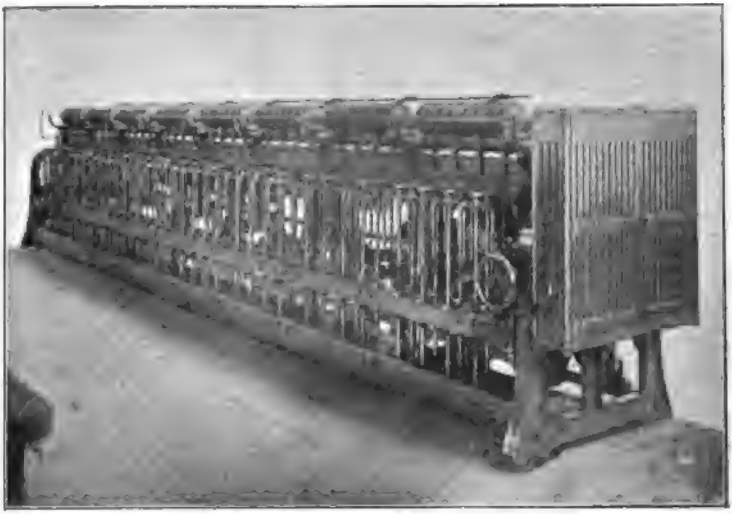


FIG. 7.
ROVING FRAME.

Dust Shaking. There is a considerable amount of waste made in the preparing department of a jute mill, such as waste from the carding, drawing, and roving processes, and this, as well as the sweepings when the mill is cleaned out, can be utilised in the production of yarn after it is freed from impurities. It is cleaned frequently for the spinner's own use, in his own mill, in a machine known as a "dust shaker." A common form of this machine is a machine having two cylinders provided with large pins, between which cylinders, as they revolve, the material is shaken free of dust and other impurities and delivered in the form of clean "tow." The dust falls to the bottom of the machine through a grating as the "tow" passes through into a receptacle so disposed as to receive it. Unenclosed lights should not be allowed too near this machine, as the fibre is in a light, open, and easily ignitable condition, but if the machine is properly designed with a close metal case the hazard is minimised.

Spinning. The spinning frame used in jute mills is Fig. 8. "Mule" or "ring" spinning is never done in jute mills, as jute cannot stand the strain. For spinning, the rove bobbins are placed in position and the rove led through past the retaining roller and over guides between the drawing roller and the pressing roller, where, perhaps, a draft of 9 is given, and so on through the eye of the "flyer." When you are looking at a spinning frame at work you will see the thick rove coming down, but immediately it has passed the pressing

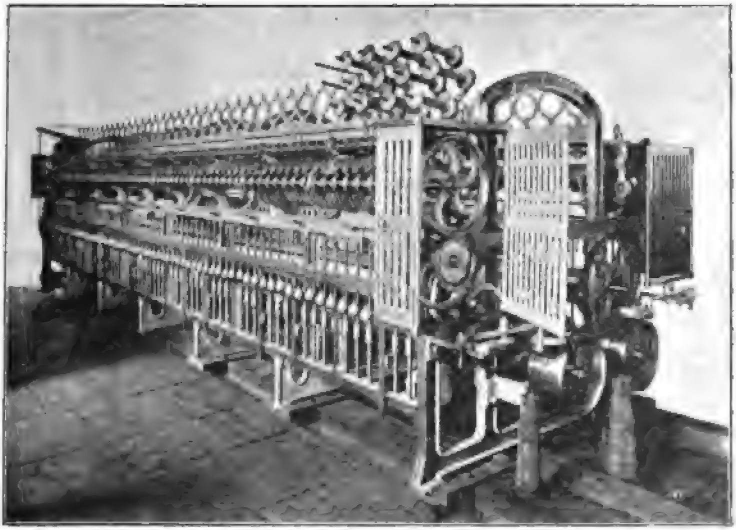


FIG. 8.
SPINNING FRAME.

roller it is changed into yarn. Warp yarn gets about five turns and weft about three and a half turns to the inch, or more or less according to fineness. The yarn is wound on to bobbins. I think I am safe in saying that the speed of jute spindles is rarely more than 3000 revolutions a minute.

Processes subsequent to Spinning and preparatory to Weaving. In this connection the tariff mentions only the following, namely,—reeling, warping, twisting, and doubling, but there are others to which I shall refer, namely, spooling, winding, dressing, beaming, and cam-drawing.

Warping means the process of winding warp yarn on to the warping mill; winding may mean either warp winding or cop winding; twisting and doubling are the same thing, and the process is twisting separate yarns into one. The twisting frame is just like the spinning frame, only there is no draft.

The process of reeling, twisting, and doubling are only carried on in mills where they spin, and warping, dressing, beaming, and cam-drawing are done only in weaving factories. Reeling is not to be confounded with "hank-winding," nor warping with "warp-winding."

Reeling. Reeling (Fig. 9) is done to both warp and weft if it is to be sent to the bleacher or dyer. The process is not hazardous from an Insurance point of view, as the speed is not so great as to lead to friction.

Spooling or Roll Winding. This applies only to warp, and the machine (Fig. 10) winds from the spinning frame bobbins into rolls which are afterwards placed on the "bank," and the yarn beamed (dressed or undressed) ready for weaving, unbleached and undyed. Spooling is akin to warp winding, only the yarn is wound into "spools" instead of on to warp bobbins. Spooling is a very common process, as most of the yarn in Dundee is woven unbleached and undyed. Dyed yarn coming into the factory from the dyer, in hanks, can be spooled from a machine with reels attached, called a "hank machine."

Warp Winding. This is a process (Fig. 11) of winding warp yarn from the spinning frame bobbins on to warp bobbins instead of into spools, and is sometimes more convenient, as the bobbins take up less space on the "bank" than spools, which is of importance when a very broad piece is to be woven. Dyed yarn can be wound on to bobbins from the hank by a machine similar to the "hank machine" just mentioned.

Weft Winding or Cop Winding. This is the process of winding "weft" yarn into "cops" or coils (Fig. 12) suitable to fit into the shuttle, and can be done either from the spinning bobbins or from reels.

Warping. Warp yarn is sometimes wound on the warping mill before beaming, and the process is known as warping. The warping mill is often driven by hand or foot power.

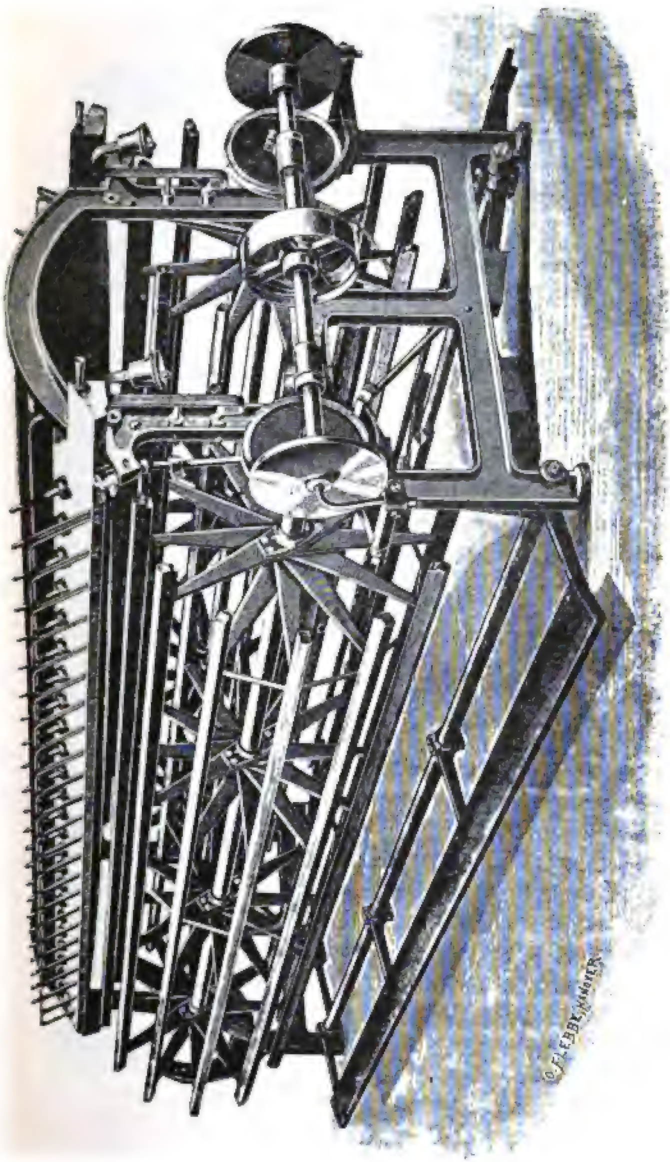


FIG. 9.
POWER REEL.

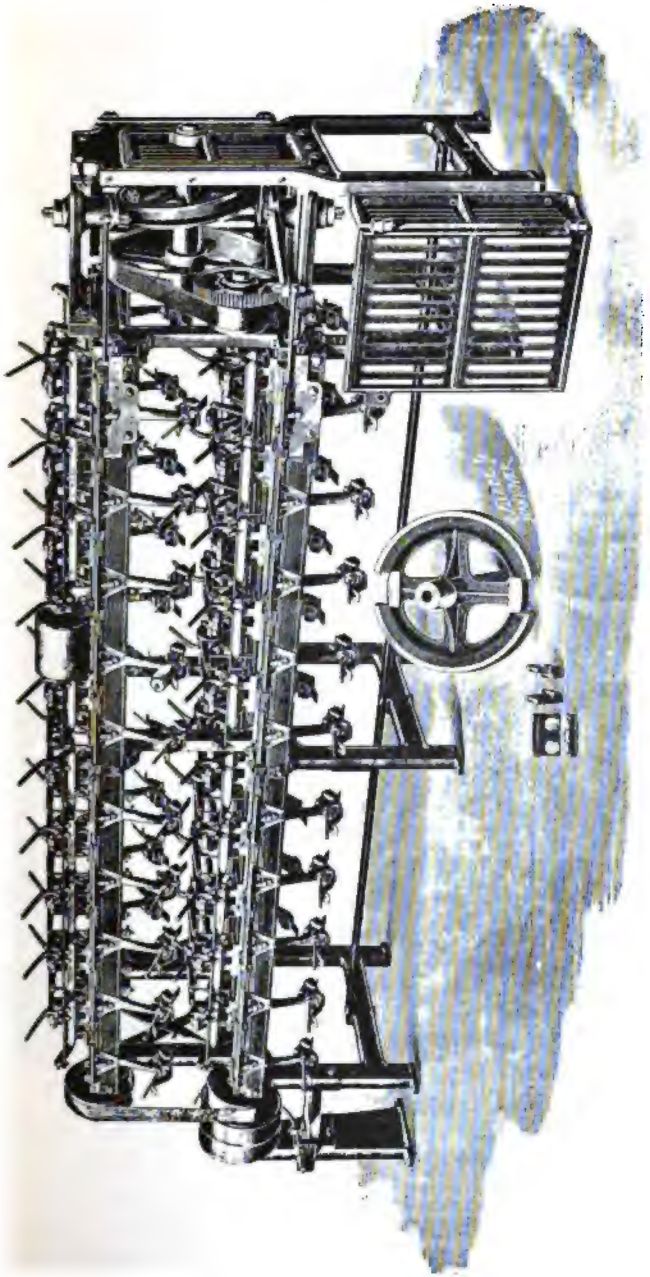


Fig. 10.

Spooling Machine or Roll Winding Machine, to wind from Bobbins.

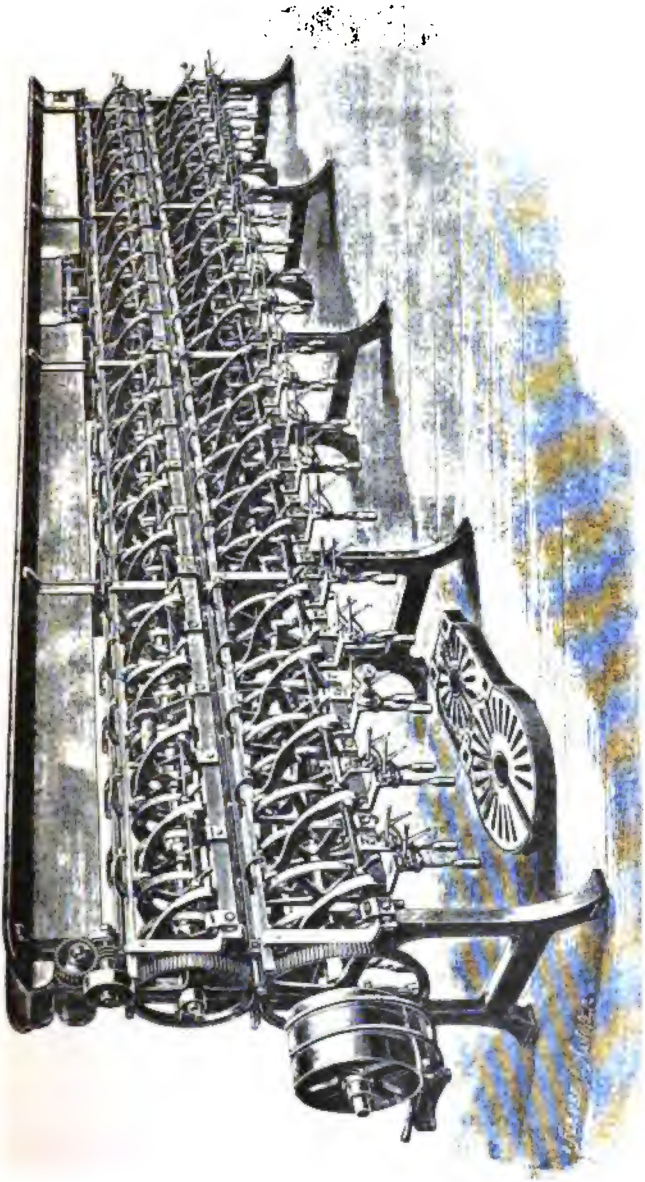


Fig. 11.

Warp Winding Machine, to wind from the Spinning Frame Bobbins.

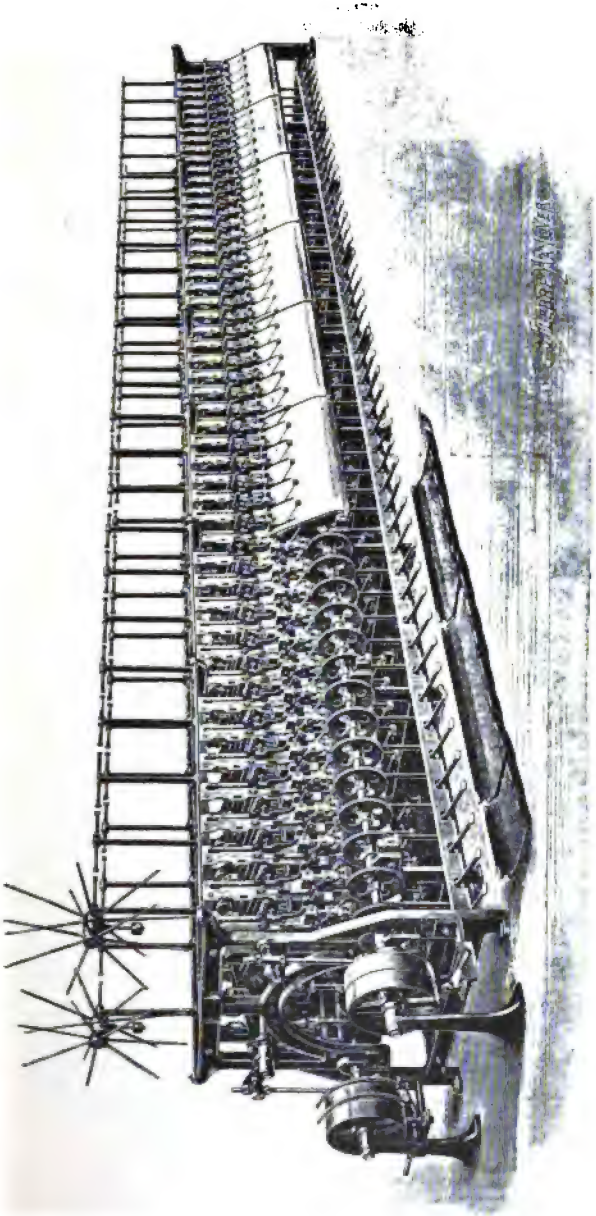


FIG. 12.
COP OR WEFT WINDING MACHINE, TO WIND FROM REELS.

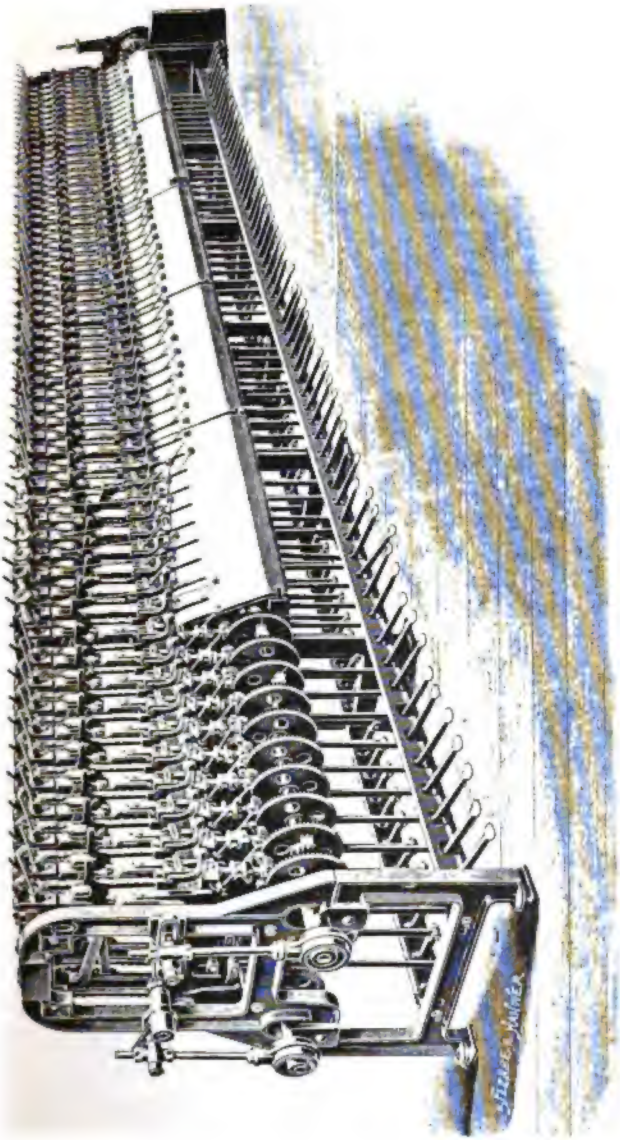


FIG. 12.
COP OR WEFT WINDING MACHINE, TO WIND FROM BOBBINS.

Dressing or Starching. In order to better enable warp yarn to stand the strain of weaving it is usual to employ the dressing machine, through which the yarn is led from the "bank" through a dressing of flour starch or farina (heated by steam) and then pressed by rollers. After passing round steam-heated cylinders it is wound on to the yarn beam of the loom. The heating arrangements do not present any fire hazard, as a very moderate heat is all that is required.

Beaming. This is the process of winding warp yarn on to the beam which is the roller at the back of the loom.

Cam-Drawing. This process, which in other districts is called, I believe, "drawing-in," consists in drawing the warp threads through the heddles or "cams" of the loom.

Cam Making. The "cams" are usually cotton threads which have been treated with linseed oil and bees-wax. The process of cam making is not carried on in jute works, unless in the workshops of very large establishments, as the "cams" are usually bought ready made. It is necessary that "cams" should not be allowed to lie in a heap or in a confined space on account of the danger to which they are exposed of taking fire spontaneously owing to the linseed oil with which they have been dressed. They should be hung from racks in a well ventilated place, and the Surveyor ought to enquire as to how "cams" are stored. I have not any fire among my records stated to be due to the spontaneous combustion of "cams," but I am almost certain one considerable loss was due to the fact that the firm's store of "cams" was too closely packed on racks, and spontaneous combustion arose owing to insufficient ventilation.

Power Loom Weaving Factories. It is mostly plain weaving which is done in jute factories, as the staple "hessian" cloth is a plain woven cloth, and therefore ordinary looms are those most commonly met with. But for jute carpets, and there are a few risks which are devoted solely to that manufacture, Jacquard looms are used; while for weaving twilled sacking, and such like, a loom somewhat more complicated than ordinary is required. Hand looms are also sometimes met with for weaving patterns for instance. The principle of all looms is the same, namely, to get a proper "shed" of the warp so that the weft can interlace itself in the

desired manner. It is unnecessary to describe looms, beyond referring to Fig. 13, an ordinary power loom. The Surveyor should particularly note the cleanliness of the machinery in a jute weaving risk, as the yarn while being woven gives off a fine

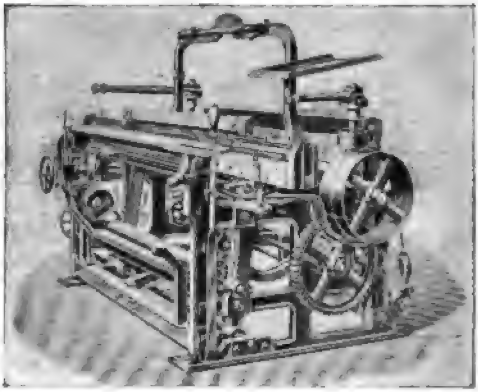


FIG. 13.
ORDINARY POWER LOOM.

"caddis" or fluff, and fires sometimes occur through friction or lights igniting the "caddis." Such friction fires occur mostly through friction in the treddle pulleys which raise and lower the heddles.

Calenders or Cloth Finishing Risks.

There is a considerable difference in the processes found in calender risks, as there are calenders which only finish cloth for a particular mill, while others do cloth finishing of all kinds for the trade, such as public calenders. The usual processes in calenders are cropping, damping, mangling, calendering, lapping, measuring, sack-cutting, sack-stamping, sack-printing, sack-sewing, crisping, and packing. Proofing, which I shall refer to afterwards, is sometimes met with.

Cropping.

Cropping consists in shaving the surface of the cloth, by means of a cropping machine (Fig. 14), clean of the fine hairs attaching to it. This machine has two or four barrels (revolving at about 1100 to 1200 revolutions a minute) with thin steel knives set spirally round them, and shears a clean surface against fixed blade knives. Naturally a fine fluff is given off from the cropper, and cleanliness is most essential to prevent fire hazard.

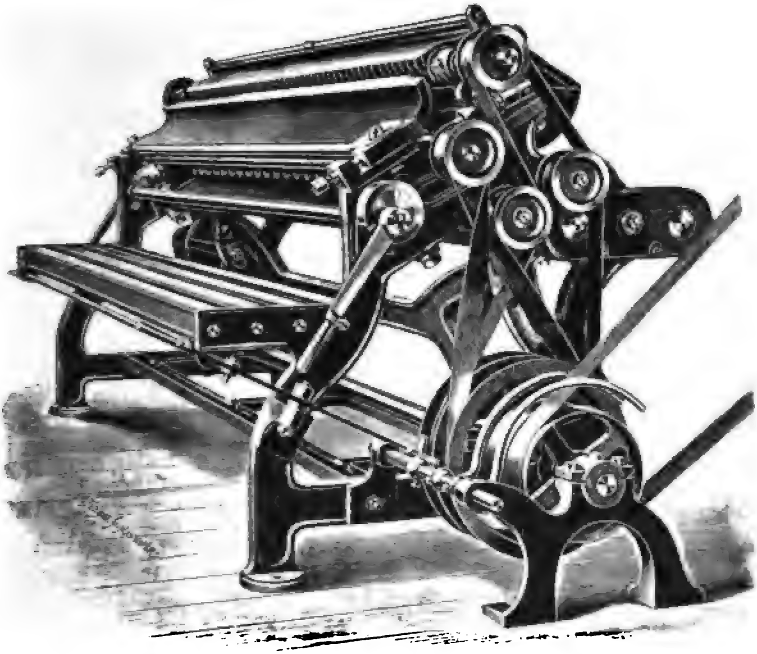


FIG. 14.
CROPPING MACHINE.

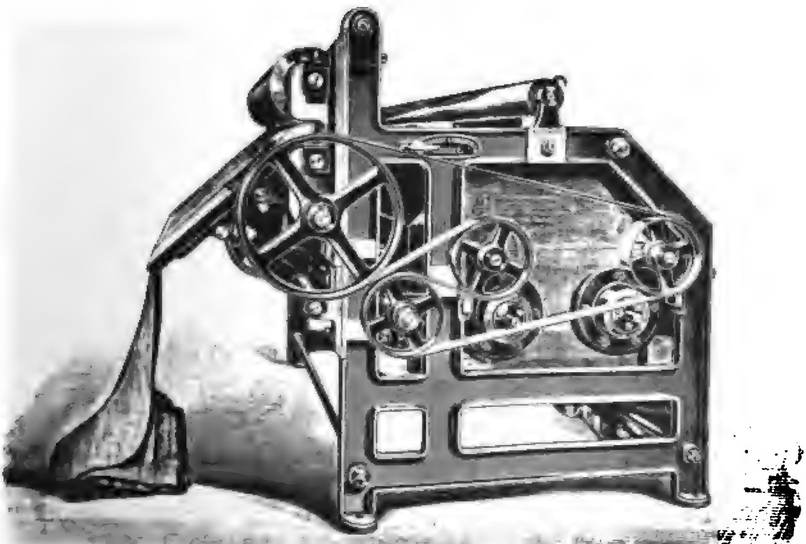


FIG. 15.
DAMPING MACHINE.

Damping. Before calendering or mangling the cloth is put through a damping machine (Fig. 15) which has revolving brushes which gently sprinkle the cloth with water.

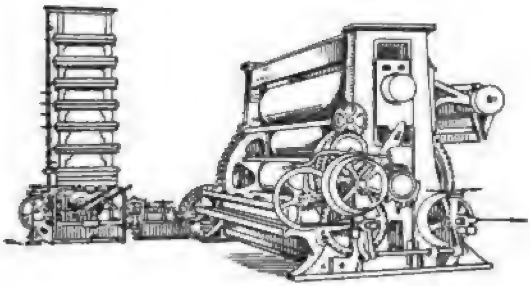


Fig. 16.
Patent Hydraulic Calender Mangle.

Mangling. A mangled finish is given on the mangling machine (Fig. 16) by the cloth being passed between its rollers at tremendous pressure. The rollers of the mangling machine make a revolving motion of about one revolution and a half forward and then back again a little. It is remarkable that the pressure is so great as to heat the cloth slightly (which is essential for a good mangled finish), although the rollers are not themselves heated.

Calendering. The calendered finish is given on the machine (Fig. 17) by the cloth passing between paper rollers and an iron roller, heated by steam or gas, and the process is, in that respect, different from the mangling machine.

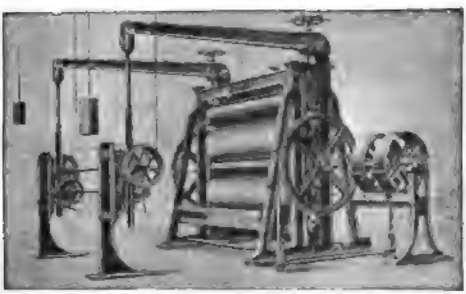


Fig. 17.
Heavy Five-Bowled Chesting Calender.

Lapping. The lapping machine is for folding the cloth by means of an arm with a slit, through which the cloth is passed, and which swings back and forward laying lengths of cloth one above the other. The friction of the cloth passing through the slit gives off a fine dust, and the surveyor's attention should be directed to perfect cleanliness being maintained.

Crisping. This is the name given to a proces of folding cloth into half its original breadth, and the machine used is Fig. 18.

Measuring. Machines are sometimes used for measuring the the lengths of the various pieces or webs.

Sack-Cutting. Machines are sometimes used which measure the required length of sacking and then cut it off, but other machines only measure the cloth, and the operative draws a knife across the web by hand. For some such cutting machine see Fig. 19.

Sack Sewing. This is done by sewing machines, called overhead sewing machines, driven by power; the mouths of the bags are sewn by machines similar to ordinary sewing machines, likewise driven by power.

Stamping Printing. This may be necessary in order to print trade or other marks on the cloth, and is sometimes done by hand or by printing rollers. The surveyor will satisfy himself as to the nature of the colours used and the safe storage of lampblack, if that is kept, to avoid the risk of spontaneous combustion.

Packing. The making-up and packing of bales of cloth requires the use of powerful hydraulic presses.

Special Cloth Finishing Processes. In this connection I refer to the process of proofing, which I already mentioned. The process consists in coating the cloth with paraffin wax and linseed oil, or suchlike, to make it waterproof. The paraffin wax is melted by steam heat (paraffin wax melts at from 112° to 125° F.), and the cloth is passed through rollers and so coated with the wax. Naphtha is sometimes used with the wax, and in such a case good ventilation and the absence of open artificial light and heat in the building is essential, besides strict regulations regarding the storage of the naphtha.

Singeing. This may be done to remove the hairs from the surface of the cloth by means of a gas-heated machine.

Fig. 18.
Crisping Machine.

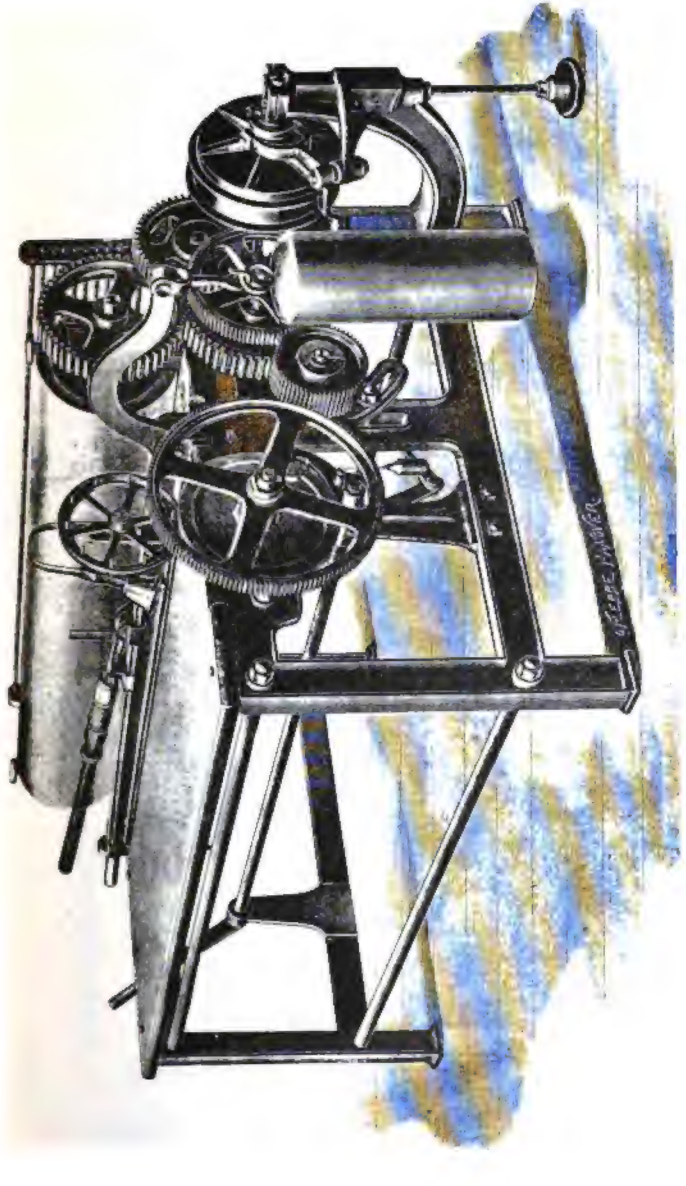


Fig. 19.
Sack-Cutting Machine.

Twine Making. The principal processes are twine twisting, polishing, balling, singeing, and perhaps tarring.

Twisting of Twine. The principle of the machinery used in this process is similar to spinning, although the spindles are heavier; and in the case of heavy twists I have seen the twisting done horizontally on a device different in appearance from the yarn spindle, but the same in essential particulars.

Twine Polishing. This process gives twine a dressing similar to yarn dressing. The machines are similar, except that the twine is held against a rapidly revolving grooved roller before it leaves the machine, and

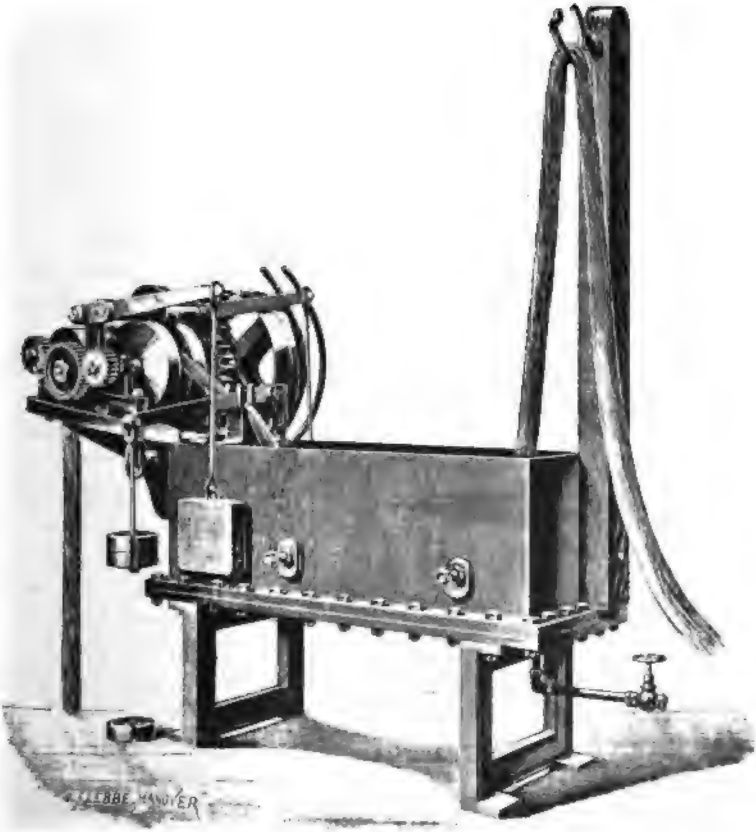


Fig. 20.
Twine Tarring Machine.

so gets a polish which yarn does not receive. Beeswax is used for twine polishing.

Balling. Balling is done on machines which rapidly convert the twine into balls ready for sale.

Singeing. The balls of twine are singed on the surface by means of securely arranged gas jets held in the hand, and which become almost extinguished when not in use.

Tarring. This is generally done by passing the twine through a trough containing Archangel tar melted by steam heat. (See Fig. 20.) The chance of the tar boiling over is reduced to a minimum, and the risk of it taking fire very remote. It is advisable, however, to have the tarring done in a separate building from the main risk and the department kept scrupulously clean.

Ropes. Ropes are also made from jute to some extent. The procsss of rope-making has been described in Vol. III. of the "Federation Journal," so that it is superfluous for me to deal with the subject.

RISE AND DEVELOPMENT OF THE JUTE TRADE IN THE UNITED KINGDOM.

In offering a few remarks on the rise and development of the jute trade of the United Kingdom, I can only give, very briefly, the main facts connected with it, as space and time will not permit of a more elaborate treatment of the subject.

About 1796–1797, the East India Company had a small parcel of jute sent to them from India. This is supposed to have been used in the neighbourhood of London in the manufacture of door mats, ropes, or such like. It was not till 1822–1823 that jute was woven into cloth. At that time, however, it was woven by a firm of woollen carpet manufacturers at Abingdon, who hoped to find the material as workable as wool. It was not till about 1823–1824 that experiments were made with jute in Dundee. It was then hackled like flax and worked over flax systems, but the effort does not seem to have been very successful.

Great difficulty was found for a long time in selling cloth made with jute, as there was a prejudice against the fibre and a suspicion that it would not stand the effects of damp. Indeed, manufac-

turers found it necessary to warrant their goods "jute free" in order to obtain the confidence of the market.

Jute-spinning was again tried in Dundee in 1825 or 1826, but again unsuccessfully; and it was not till 1832 that jute yarn was successfully spun.

Shortly after that date, however, the trade may be said to have been established, and Dundee is now the chief centre of our jute manufactures. For a considerable period, however, a want of confidence in the ultimate success of the fibre in textile manufactures seems to have prevented spinners from going to the expense of erecting special machinery for the treatment of jute, and the manufacture of it on flax systems continued with indifferent results.

Through the exertions of a Dundee merchant the Dutch Government agreed to use jute bagging as coffee bagging in their East Indian trade, and this gave a considerable impetus to the manufacture of jute. This was in 1838. Previous to that time hardly any pure jute yarn was spun, as jute was mixed with codilla or with flax, and people were accustomed to look upon such a mixture as an adulteration, and viewed the products with suspicion. Since 1838, however, times have changed, and the progress of the jute trade has been continuous and rapid, chiefly owing to the large demand which has sprung up on all sides for coarse linens.

Mr. Warden, in his "History of the Linen Trade," states that the cultivation of flax has never kept pace with the demand of the world for linen, and he leaves us to infer that the jute trade owes its prosperity chiefly to the fact that jute cloth is suitable as a substitute for linen cloth of the coarser qualities.

The history of the rise of the jute trade is, then, very briefly summarised in the above sentences. It is my hope that the above indicates the main facts sufficiently for our purpose, and affords information not without interest.

I have only further to add a few statistics of the jute imports and exports of the United Kingdom, along with a return of the number of spindles and looms engaged in the trade; and I have also compiled, in the hope that it may prove of interest, a note of the jute spindles and looms working in foreign countries so far as I could ascertain them.

To this is added an estimate of the present yearly consumption of jute by the different countries of the world to show that the trade is by no means confined to the United Kingdom.

These figures are taken from official returns or reliable estimates, and, while they cannot be guaranteed, they may be assumed as accurate.

Imports of Jute into the United Kingdom.

Year.		Quantity.
1796–1797	First recorded Import of Jute, .. No Record till 1822.	Small Parcel.
1822–1835	.. ..	Experimental Parcels.
	Gradual increase till 1854 when Jute was first shown separately in the official statistics of the trade of the United Kingdom.	
		Tons.
1854	.. ..	20,936
1860	.. ..	40,839
1870	.. ..	118,835
1880	.. ..	231,945
1890	.. ..	369,958
1900	.. ..	280,919
1901	.. ..	321,331

[Tables.

Recent Exports of Jute Manufactured Goods.

YARN.

		1898.	1899.	1900.	1901.
To Germany, - - -	lbs.	2,877,300	534,000	92,100	21,100
,, Spain and Canaries, -	,,	2,876,700	8,699,500	5,425,400	4,705,500
,, United States, - -	,,	359,300	712,700	1,550,000	839,200
,, Brazil, - - -	,,	21,446,300	20,292,000	21,104,100	27,992,800
,, Other Countries, -	,,	22,085,800	15,013,000	10,536,500	9,421,900
Total, - - -		49,645,400	45,251,200	38,708,100	42,980,500

PIECE GOODS OF ALL KINDS.

		1898.	1899.	1900.	1901.
To Germany, - - -	yds.	2,619,400	1,035,500	561,900	671,900
,, France, - - - -	,,	1,900,900	871,700	452,800	296,800
,, United States, - -	,,	104,796,700	109,414,200	86,473,000	121,673,700
,, Brazil, - - - -	,,	8,977,300	2,670,500	1,302,600	2,960,800
,, Argentine Republic, -	,,	25,530,800	38,916,300	31,181,900	33,955,200
,, Australia, - } -	,,	7,991,300	9,218,500	9,154,200	6,013,300
,, New Zealand, }					4,143,900
,, Canada, - - - -	,,	15,814,000	11,861,500	13,539,000	15,590,000
,, Other Countries, -	,,	45,432,600	39,275,900	31,361,400	31,116,700
Total, - -	,,	211,062,700	213,264,100	173,976,800	215,422,300

JUTE SPINDLES AND LOOMS WORKING IN THE UNITED KINGDOM.

DISTRICT.	No. of Mills.	No. of Spindles	No. of Doubling Spindles	No. of Looms.	Number of Hands Employed. Males.	Females.	Total.
SCOTLAND.							
Spinning only— Dundee District, - -	24	77,658	3,131	—	2,559	4,645	7,204
Weaving only— Dundee District, - -	34	—	—	5,219	1,646	4,535	6,181
Unenumerated— Dundee District, - -	1	—	—	—	16	64	80
Spinning and Weaving— Dundee District, - -	41	159,241	7,691	7,364	8,634	16,816	25,450
Spininng and Weaving— Aberdeen District, - -	1	2,568	—	168	86	347	433
Spinning and Weaving— Glasgow District, - -	2	2,738	46	146	66	471	537
ENGLAND AND WALES.							
Spinning only— London District, - -	1	500	130	—	14	45	59
Unenumerated— London District, - -	1	—	—	—	6	—	6
Weaving only— Somerset, Wilts, Devon, Dorset, and Cornwall, -	3	—	—	81	217	53	270
Spinning and Weaving— Lancashire District, -	2	10,560	524	522	441	1,676	2,117
Spinning and Weaving— Essex, Suffolk, and Norfolk,	2	10,540	192	434	483	1,236	1,719
Unenumerated— Wales and Monmouth, -	1	—	—	—	4	—	4
IRELAND.							
Spinning and Weaving— Leinster District, - -	2	3760	140	145	220	414	634
Munster District, - -	1	600	20	28	16	100	116
Grand Total, - -	116	268,165	11,874	14,107	14,408	30,402	44,810

Extracted from a Parliamentary Return dated 1890.

JUTE SPINDLES AND LOOMS WORKING OUTSIDE THE UNITED KINGDOM.

Part of the World where the Mill is.	No. of Spindles	No. of Looms.	No. of Mills.	Remarks.
INDIA—				
Calcutta District, - -	306,720	15,336	—	Spindles taken as 20 per loom.
AUSTRIA—				
Bohemia, - - - -	18,088	1,287	9	
Moravia and Silesia, -	5,300	998	8	
Upper and Lower, - -	13,000	650	1	
HUNGARY. - - - -	8,492	724	3	
GERMANY—				
Prussia, - - - - -	58,612	2,926	15	
Saxony, - - - - -	17,452	839	5	
Würtemberg, - - -	1,852	150	1	
Baden, - - - - -	7,326	342	1	
Braunschweig, - -	11,314	555	1	
Saxe-Weimar, - -	4,740	261	1	
Reuss, - - - - -	10,040	421	1	
Oldenburg and Bremen, -	24,438	1,288	3	
Alsace-Lorraine, - -	5,812	255	1	
BELGIUM, - - - -	—	—	—	Large industry; spinning and weaving; official statistics could not be obtained.
HOLLAND, - - - -	—	—	1	Statistics incomplete.
ITALY, - - - - -	—	—	13	Do. do.
RUSSIA, - - - - -	13,465	990	11	Do. do.
FRANCE, - - - - -	—	—	—	Large industry; spinning and weaving; official statistics could not be obtained.
NORWAY AND SWEDEN,	—	—	—	Two or three works; spinning and weaving.
SPAIN, - - - - -	—	—	—	Do do.
UNITED STATES, - -	—	—	—	A growing but as yet unimportant industry in the United States; half a dozen works or so.
CANADA, - - - -	—	—	—	Important cloth and finishing works.
SOUTH AMERICA—				
Brazil, - - - - -	—	—	—	Six or eight weaving risks; growing industry; 200 looms in a new factory recently started.
Argentine, - - - -	—	—	—	Weaving industry; growing industry.
Mexico, - - - - -	—	—	—	Two or three works; spinning and weaving.
JAPAN, - - - - -	—	—	—	One establishment.

ESTIMATED CONSUMPTION OF JUTE PER ANNUM.

In Europe.

	Bales per Annum.
Scotland,	1,100,000
England,	40,000
Ireland,	20,000
France,	450,000
Belgium,	110,000
Germany,	650,000
Austria,	250,000
Norway and Sweden,	50,000
Russia,	150,000
Holland,	20,000
Spain,	90,000
Italy,	130,000
	3,060,000
In India.	
Mills,	2,400,000
Local,	500,000
	2,900,000
In America.	
	500,000
Gross Total,	6,460,000

Goods Manufactured from Jute.

The kinds of goods manufactured from jute are many and various. Some jute cloth is made from yarn in the natural state, but in most cases the warp is dressed with flour starch or farina.

A difficulty has hitherto been experienced in bleaching jute cloth with the best results, but recently much progress has been made. Both the colour and the strength is better, and the waste has been reduced.

Jute yarn can be dyed the most vivid colours, and dyed jute yarn is extensively used in the mauufacture of jute carpets.

In addition to cloth made wholly of jute, unions are made with flax, tow, or cotton, a jute weft being woven along with a warp of the other material. Occasionally jute and flax are mixed together in the preparing processes and spun into a mixed yarn.

It would be difficult to give a complete list of goods made from jute, but the following is fairly comprehensive, and will give a pretty accurate idea.

Different Kinds of Jute Cloth—Wholly of Jute.

Hessian is a plain woven cloth made in three main qualities, namely, "light," "medium weight," and "heavy." The quality of yarn used is from about 6 to 7 lb. warp per spyndle to 10 lb. warp per spyndle, the corresponding wefts being from 7 to 16 lb. per spyndle. "Hessian" cloth weighs about 5 oz. to 16 oz. per yard of 40 in. broad, according to fineness, the standard being 10½ oz. per yard. "Hessian" is used rough, cropped, mangled, calendered, starched, and bleached. It is not often dyed. Its chief employment is for packing purposes of all kinds, for which it is used to a very large extent both in this country and abroad.

MEMO.—The fineness of the web as regards *warp* is calculated according to "porter." The "porter" is ·925 of an inch. The finer the web, of course, the more threads are contained in the breadth of a "porter," which is measured by a magnifying glass of that size. It may be of interest to state that the number of *weft* threads are in these days more commonly calculated by so many per inch of space instead of by a "porter," so that two standards of measure are in use.

Bagging and Sacking is made plain, of both single and double warp, and is then known as S.W. or D.W. plain sacking or bagging. In quality it is commonly of 6, 7, 8, or 9 "porter."

Twilled Sacking is usually made with a coloured stripe, both in single and double warp qualities, and of a standard width of 29 in., 6 to 12 "porter," and containing about 8 lb. warp and 24 to 64 lb. weft.

Arrowhead Twilled Sacking is twilled sacking with an arrowhead pattern.

Hop Pocketing.—This may be made from a well-made twilled sacking having two stripes in the width; 8, 9, or 10 "porter," both S.W. and D.W., the S.W. being made in the grey, or perhaps bleached; or it may be a heavy 14 "porter" jute tarpaulin, weighing about 24 oz. per square yard.

Tarpaulin.—A good heavy jute cloth from 9 to 16 lb. weft and 8 lb. warp, and made both S.W. and D.W.

Tarred Tarpaulin.—The last mentioned tarred.

Brattice Cloth.—Used in mines; may be made from tarred "hessian," bagging, or sacking.

Rove Bagging.—Made with a warp of yarn but a weft of "rove."

Padding.—Used by tailors for stiffening parts of clothing. It is usually of jute when found in cheap clothing. It may be dyed, stiffened with size or glue, glazed, or otherwise worked up to suit different classes of the tailoring trade.

Buckram.—Common "hessian," after being stiffened with glue, has been known to be used by dressmakers under this name.

Leather Cloth.—Cheap travelling bags and other articles, and book binding "leather" are sometimes made from jute cloth, with a coating of some material laid on by a kind of japanning process.

Upholstering Cloth of various kinds, on cheap furniture, is often jute cloth of one kind or another.

Brazil Bagging.—Light rove bagging.

Linoleum Foundation is made from strong rough "hessian," weighing from 8 to 10 oz. per square yard. This is used in linoleum factories as the foundation on which they lay their mixture of oil or cork or other substance to make linoleum.

Floor Cloth Foundation is a 5, 6, or 8 yards wide heavy "hessian," weighing from 12 to 24 oz. per square yard.

Carpets and Mats.—There is a large trade in such goods, as jute yarn can be dyed the most brilliant colours suitable for cheap carpets. Imitation Axminster and Brussels carpets can be made with jute yarn, but it may be readily understood that they are are not nearly so durable as the real articles.

Biscuit Bagging is a light jute fabric made from yarn, weighing as light as 4 lbs. per spyndle.

Scrim.—Lighter than Biscuit Bagging, the yarn being perhaps only 3 lbs. per spyndle.

Artificial Human Hair.—Human hair can be passably imitated in jute—for theatrical purposes, for instance.

Twines and Ropes in considerable variety, especially twines.

Unions. The most common union cloths with jute are cloths containing jute yarn, along with flax, tow, or cotton yarn. The most common way is that of weaving jute weft along with flax or tow warp in the manufacture of what are called "tow-warp hessians." Cotton warps are used along with jute wefts or tow wefts, in making what are known as "Forfars."

It is possible that jute yarn may be used more or less in the composition of window hollands, horse cloths, drills, dowlas, crumbcloths, waggon covers, roofing canvas, diapers, towelling, &c., in fact in any textile fabric where its cheapness would overcome its lack of quality.

Passing from textile fabrics made of jute, there are no doubt many uses to which jute can be put. It is impossible to give an adequate idea of the whole, but among the most unexpected it might be interesting to mention its use for insulating electric cables, which is a commentary upon the old belief that it could not stand damp well. One can also get tennis shoes soled with jute, and I have even heard that whisky has been distilled from jute roots.

A point of view from which to consider the jute manufacture which naturally occurs to one is, to what extent have jute goods superseded goods formerly made from flax. From the above list it will be seen, generally speaking, that many kinds of cloth now made from jute must in former times have been made from flax. It is likewise obvious that many kinds of cloth are now made from jute which were not thought of in the days of flax.

It is not probable that jute will ever be cultivated fine enough to compete with the finer qualities of linen goods, and notwithstanding recent improvements in the bleaching of jute cloth it is also likely that bleaching will always prove a difficulty.

One cannot of course foresee what may happen in the future, but in the meantime let us hope that both the flax trade and the jute trade will alike prosper and add to our national wealth and swell the profits of the Insurance Offices with increasing premiums and a diminishing loss ratio.

Jute Works Risks from an Insurance point of view.

This paper would not be complete unless it contained a treatment of its subject from an Insurance point of view. I have, therefore, to offer the following remarks under that heading, and trust that they will be found useful to us in our business.

We shall obtain benefit from the consideration of our subject under the following heads, namely :—

(1) The importance of jute works business to the Insurance Offices.
(2) Fires which have occurred in jute works and their causes.
(3) The parts of the works where fires have been known to break out.
(4) The processes and machines which have chiefly been the cause of fires.

The Importance of Jute Works Business.

One can only estimate the total insurable value of the jute works in the United Kingdom, as there are no exact figures to go on, but from information which has been kindly supplied me by experts, I am inclined to put the value down at not less than £5,500,000. As nearly all jute mills are private concerns, I have not attempted to state the capital employed in the jute industry.

This sum is not so important as the value of some of our other staple industries, but it is large enough to yield an amount of premium of considerable consequence to the Fire Insurance Offices. It would be entirely satisfactory if we could only carry all our premiums on jute works forward as profit year by year, but it is one of the hard facts of our business that we never can do that. We cannot measure our profits by the volume of our premiums, and so it behoves us to study fires and their causes, and learn from them how to make our business profitable.

Number and Causes of Fires.

I have, therefore, first to direct your attention to a statement of 100 fires which have occurred in jute works during the years 1886 to 1902 inclusive, with their causes. The form in which this statement is given enables us to see the whole period at a glance. Subsequently we shall analyse the statement in detail, but in the meantime it may be explained that I have sub-divided the causes wherever there was an essential difference worthy of being put in a separate category, so that we might see the causes in their fullest variety consistent with necessary grouping. Most of the causes explain themselves, but we might remark with reference to "careless use of lights," that it refers to the misuse of necessary lights, while "defective lighting arrangements" applies only to fires caused by unsafe gas jets, swing gas brackets, and other similar objectionable methods of illuminating the works. Under the heading of "stray matches trodden on," I have put only those fires caused by matches improperly straying on the floors and being struck under foot.

Coming now to a closer examination of the statement of fires, you will notice that it contains the record of 100 exactly. It ought to be explained that this is a coincidence and not design, for although there had to be excluded a certain number of cases which I was not sure about, as many fires as possible have been included.

STATEMENT No. 1.

Number and Causes of Fires in Jute Works from 1886 to 1902 inclusive.

CAUSE.	YEARS.		No.	YEARS.					No.	YEARS.					No.	YEARS.					No.	TOTAL No.
	1886.	1887.		1888.	1889.	1890.	1891.	1892.		1893.	1894.	1895.	1896.	1897.		1898.	1899.	1900.	1901.	1902.		
Friction in Carding Machines,	1	1	2	...	1	...	...	...	1	...	1	4	4	1	10	5	3	2	3	4	17	30
Careless Use of Lights,	...	3	3	...	1	...	2	2	5	1	...	2	2	2	7	...	...	...	1	1	2	17
Stray Matches trodden on,	1	1	2	...	...	...	1	...	1	...	1	1	...	1	3	1	1	1	...	2	5	11
Friction in Spinning Frames,	...	...	...	...	...	...	...	...	...	...	1	2	...	1	4	...	1	2	1	...	4	8
Unknown,	...	...	...	...	...	...	...	...	...	1	...	2	...	...	3	1	...	1	...	1	3	6
Friction in Looms,	...	...	...	...	...	..	...	...	...	...	...	1	...	...	1	1	...	1	1	...	3	4
Friction in Drawing and Roving Frames,	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	2	1	...	3	4
Friction in Main Shafting,	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	2	3
Incendiarism,	...	1	1	...	...	...	...	1	1	...	1	...	...	...	1	...	...	...	...	...	...	3
Defective Lighting Arrangements,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	3	3
Gas generated in Boiler Flues going on fire,	...	1	1	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	2
Spark from neighbouring Chimneys,	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	...	...	...	1	2
Smoking,	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1
Spontaneous Combustion,	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1
Spark from Railway Engine,	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	1
Faulty Rocket Lighting on Roof,	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1
Friction in Teaser,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	1
Friction in Cropping Machine,	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	...	...	...	1
Burning Waste set down for a short time in a Spinning Flat,	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	1
	2	8	10	...	3	...	3	6	12	2	6	13	8	5	34	12	5	10	9	8	44	100

In order to analyse the statement more fully, kindly refer to the summary showing the percentage of fires from each cause. In this summary all kinds of friction have been brought together in one total, although still retaining their individual values. This will enable you the better to compare the percentage of friction fires with the other percentages.

STATEMENT No. 2.

Summary of the Causes of Fire.

	Percentage	Percentage.
Friction in Carding Machines,	30·00	
„ Spinning Frames,	8·00	
„ Looms,	4·00	
„ Drawing and Roving Frames,	4·00	
„ Main Shafting,	3·00	
„ Teasing Machine,	1·00	
„ Cropping Machine,	1·00	
Tl. Friction,		51·00
Careless Use of Lights,		17·00
Stray Matches trodden on,		11·00
Unknown,		6·00
Incendiarism,		3·00
Defective Lighting Arrangements,		3·00
Spark from neighbouring Chimney,		2·00
Gas generated in Boiler Flues going on fire,		2·00
Smoking,		1·00
Spontaneous Combustion,		1·00
Spark from Railway Engine,		1·00
Faulty Rocket Lighting on Roof,		1·00
Burning Waste set down for a short time in a Spinning Flat,		1·00
		100·00

It is a striking fact that more than half the fires has been due to friction of one kind or another in the machinery. I am bound to say I was not prepared for such a high percentage, but when we come to deal with the hazards of the different processes we shall be the better able to account for the preponderance of fires from that cause. There is one thing which the above summary shows very clearly, namely, the relative hazard of the different processes.

In the meantime, taking up some of the other causes of fire in their order, it is a regrettable fact to find so many fires due to the

"careless use of lights" and "stray matches." As the result of a special scrutiny under these two heads, we find that of the 17 fires due to the former cause, 9 were caused by mechanics working at the machinery, and the remaining 8 were due to lights being dropped in different circumstances through carelessness, or to lights, such as matches, being thrown down unextinguished. The latter class of fires is to be particularly regretted especially during the working hours of the mill, as three of them, so occurring, seem to hint that the method of lighting up was not safe. We may trust we have passed the days when a worker would strike a match, light the gas over a machine, and then throw the glowing match end down on the floor; but the method of lighting up is not always a proper one, and here is a class of hazard which the Surveyor could improve by careful inquiries and reasonable suggestions for a safe system.

As regards fires caused by "Stray matches being trodden on," the frequency of these fires is an unfavourable feature. If it is not possible to have the work-people searched for matches before entering the works, they might be instructed to leave their pipes and matches at the lodge, and a light might be kept burning there from which they might light their pipes on going out, so that they would not have any inducement to carry matches in their pockets.

It is a pity that six of the fires are returned as "Unknown," but we know to our cost that it is not always possible to ascertain the exact cause of a fire.

There are, unfortunately, three cases of "Incendiarism" to report, but a more favourable view may be taken of these when it is known that two of them were caused by the mischief of small boys. There is nothing in my knowledge to reflect on the character of the owners of the works, who are an upright and honourable class of business men.

It is with considerable satisfaction that we can call attention to the fact that there have been only three fires in the 17 years due to "Defective lighting arrangements." Each of these was caused by unprotected gas jets being in unsafe positions. The use of swing gas brackets is most objectionable, and wherever he sees them the Surveyor should endeavour to have them replaced by a more satisfactory system of lighting. The use of electric light is becoming more and more common in jute works, and is an improvement. Electric lighting has its own dangers, particularly

those of defective installations, but is free from the two chief dangers of gas lighting, namely, unprotected lights and unsafe lighting up. You will notice that there is no case among my records of a fire in a jute mill due to electric light.

The only other cause which calls for special mention is "Spontaneous Combustion," of which there is one case. I mentioned in an earlier part of this paper that it is not certain that jute itself will go on fire spontaneously. You might refer in this connection to Mr. W. G. Macmillan's lecture on "Fire Risks from a Chemical Standpoint" in Volume I. of the "Federation Journal," page 296, where he says:—"The possibility of the spontaneous combustion of "jute has been denied in certain quarters as the result of experi- "ments made by the Jute Association for the purpose of testing the "point . . . . . but such experiments can with difficulty be made "exhaustive." Whatever be true of clean jute, there is reason to believe that jute impregnated with an oil which is liable to spontaneous combustion is hazardous from the point of view of fire risk. Still, it is worth mentioning again that mineral oils are not liable to spontaneous combustion, and that a mixture of animal or vegetable oil with mineral oil is less hazardous from that point of view than animal or vegetable oil alone.

Place of Outbreak of Fires.

The following statement shows in what parts of the works fires have broken out. It is chiefly useful in that it shows separately fires occurring in the machines and fires occurring in the various departments from causes extraneous to the machinery. We are thus enabled to compare the hazard of the machines with the other elements of risk. Unfortunately for this statement, several cases among my records had not the precise place of outbreak given. These have had to be entered as unascertained.

It is notable that so many as eight fires occurred in engine-houses. Fires in engine-houses have been attracting attention in various kinds of risks on account of the number which have recently originated in that department of the works. I have, therefore, taken out particulars of these eight fires in engine-houses, and annex a note of them below.

From the annexed list of fires in engine-houses it will be seen that all but one have been due to mechanics using lights. It becomes a question whether it will not be necessary to have engine-houses cut off from the main risk as a means of reducing the fire hazard.

Statement No. 3.

Classification as regards Place of Outbreak of Fire.

Preparing Department—			
Carding Machines,	30		
Drawing and Roving Frames,	4		
Teaser,	1		
Causes not connected with Preparing,	5		
	—	Total in Preparing Department,	40
Spinning Department—			
Spinning Frames,	8		
Causes not connected with Spinning	4		
	—	Total in Spinning Department,	12
Weaving Factories—			
Looms,	4		
Causes not connected with Weaving,	4		
	—	Total in Weaving Factories,	8
Calendering Houses—			
Cropping Machine,	1		
Causes not connected with Machinery,	2		
	—	Total in Calendering Houses,	3
Engine-Houses,			8
Main Shafting,			3
Boiler Flues,			2
Boiler Houses,			1
Precise Place of Outbreak not known,			14
Originating in **Outbuildings** or **Outside** the Works,			9
			100

Time of Outbreak of Fires.

Annexed is a statement showing how many fires broke out between 6 a.m. and 6 p.m., and 6 p.m. and 6 a.m., being the working hours of the mill and the closed hours respectively.

This statement gives prominence to the fact that more fires due to "careless use of lights" took place during the working hours than during the night hours. An investigation of these fires reveals that of the 10 fires during the working hours, 3 were in engine-houses from the causes above mentioned, while the remaining 7 were caused under

such circumstances as most likely suggest improper lighting-up arrangements. Of the 7 during the night hours 4 were in engine-houses, and the remaining 3 suggest that matches had been thrown down unextinguished about closing time.

STATEMENT No. 4.

Fires in Engine-Houses.

Hour.	Cause.
7 0 p.m.	Flare lamp igniting grease about the gearing.
10 0 p.m.	Careless use of lights by mechanics in fly-wheel pit.
9 10 a.m.	Unknown.
7 0 a.m.	"Breakdown of engine" (presumably careless use of lights by mechanics while repairing engine).
10 0 a.m.	Lamp igniting oily waste.
Afternoon.	Naked light.
7 0 p.m.	Engine being cleaned; piece of ignited waste fell into fly-wheel pit and set fluff on the driving ropes on fire.
5 30 a.m.	Careless use of an open wick lamp.

STATEMENT No. 5.

Classification as regards Time of Outbreak of Fire.

Cause.	Day Hours. 6.0 a.m. to 6.0 p.m.	Night Hours. 6.0 p.m. to 6.0 a.m.
	Number.	Number.
Friction, ...	52	*Nil.*
Careless Use of Lights, . .	10	7
Stray matches trodden on, . .	9	2
Unknown, ...	3	3
Incendiarism, ...	2	1
Gas generated in Boiler Flues, .	2	*Nil.*
Spark from neighbouring Chimney,	1	1
Smoking, ...	*Nil.*	1
Spontaneous Combustion, . .	*Nil.*	1
Spark from Railway Engine, .	1	*Nil.*
Rocket alighting on Roof, .	*Nil.*	1
Defective Lighting Arrangements,	3	*Nil.*
	83	17

The Processes and Machines chiefly responsible for Fires.

The data for our consideration under this heading will be obtained from a general re-perusal of the foregoing statements. It will be seen that carding has been responsible for the greatest number of fires. Friction in carding machines is of two kinds—namely, friction caused by foreign substances in the material, such as grit, nails, matches, &c., and friction caused by a pin becoming loose in the card clothing and striking fire.

I am inclined to think that the former is the more common cause. The carding process is particularly dangerous, because the material while being carded is in such a light, open, fluffy state as to be readily ignitable by the smallest spark. The fact is that claims are no real indication of the frequency of fires in carding machines, as frequently no claim is made.

Next in order come fires in spinning frames. It is difficult to say what particular part of the machine most frequently causes sparks. The same may be said of drawing and roving frames.

Then comes friction in looms. This has invariably been due to the treddle pulleys which raise and lower the heddles. Last comes friction in the main shafting.

It is next to certain that defective lubrication, or want of proper cleanliness, is the cause of most of the last four kinds of fires. Given a perfect lubricant, a perfect system of lubrication, and perfect cleanliness, we would no doubt see a reduced loss ratio under these heads. But perfect lubrication is a very difficult thing to achieve. Where automatic lubrication is not possible, it must always depend on the employé oiling the parts when required, and being careful to use the proper oil. Overheating of the main shafting is the least excusable of the four, as reasonable attention would prevent it. Without being an expert in lubricating oils, the Surveyor might look as carefully as possible into the question of lubrication, and suggest the advisability of having skilled employés to make lubrication their sole work. Any want of cleanliness should be detected, and it would be surprising if any reasonable suggestions made by the Surveyor to the management would be disregarded.

Result of the foregoing Fires.

The total claims paid under the foregoing 100 fires has been £129,290. The amounts have been spread over the years, as per the following statement:—

Years.	No. of Fires.	Amount.	Average per Fire.
1886-1887	10	£6,852	£685
1888-1892	12	70,175	5,848
1893-1897	34	19,259	566
1898-1902	44	33,004	750
17 years.	100	£129,290	£1,292

The amounts of the losses are not so important to us for study as the causes of the fires. It would not be advisable to draw absolute conclusions from the above, which are figures not absolutely complete.

There is no harm, however, in having the following statement before us in order to show the amount of loss caused in each separate part of the works :—

[TABLE.

STATEMENT No. 7.

Classification as regards Amount of Loss.

	No. of Fires.	Total Amount.	Average per Fire.
PREPARING DEPARTMENT—			
Carding Machines, . . .	30	£3,128	£104
Drawing and Roving Frames, ...	4	465	116
Teaser, ...	1	18	18
Causes not connected with Preparing, . . .	5	2,363	473
SPINNING DEPARTMENT—			
Spinning Frames, . . .	8	13,631	1,704
Causes not connected with Spinning, . . .	4	3,652	913
WEAVING FACTORIES—			
Looms, ...	4	81	20
Causes not connected with Weaving, . . .	4	14,937	3,734
CALENDERING HOUSES—			
Cropping Machine, . .	1	89	89
Causes not connected with Machinery, . . .	2	947	473
ENGINE-HOUSES, ...	8	1,652	206
MAIN SHAFTING, . . .	3	14,728	4,909
BOILER FLUES, ...	2	279	139
BOILER HOUSES, ...	1	20	20
PRECISE Place of Outbreak not known, ...	14	58,442	4,174
Originating in OUTBUILDINGS or OUTSIDE the Works, . .	9	14,858	1,651
	100	£129,290	..

If we exclude the amount of loss in the cases where the precise place of outbreak is unknown, the above statement shows that £32,140 of loss has been owing to machinery, and £38,708 has been due to other causes. I do not know that we may safely conclude that the extraneous causes are more hazardous than the machinery. When we note, however, how small the amount of loss has been in carding machines compared to the number of fires, perhaps we may safely conclude that, as a rule, a carding fire can be confined to one machine. The same appears to be true of fires in looms.

In this connection our conclusion is strengthened by the fact that all the fires in carding machines and looms have been pretty near the average. But in the case of fires in spinning frames it is different, for nearly the whole total under that head is due to one fire; and the same remark applies to the case of fires caused by main shafting.

One observation occurs to me from the fact that carding fires have been so numerous, and yet of so relatively little cost, namely, that it is not necessarily the most frequent cause of fires which is the worst part of a fire risk.

Theoretically one is inclined to say that it ought to be so; but for practical purposes the hazard which should contribute the greatest part of the rate is the one which is most costly to the Offices.

Scientific fire-rating in the present day recognises the many elements which go to form a "fire risk" in the sense of deserving expression in the rate per cent. Greater instruction cannot be obtained than from the study of our tariffs on this point, or from that comprehensive rating work, the "General Schedule," issued a few years ago in the United States.

I would like to say a few words about

Cleanliness in the Works,

which is of paramount importance. The Surveyor should in particular examine out-of-the-way corners, where the carelessness of work-people often defeats the most careful management. I once saw in a good mill a corner of one of the buildings where the oil dripping from the shafting was falling on to a pile of sawdust placed there to receive it, surely without the knowledge of the manager. Sometimes oily waste will be swept out of sight into a corner, and in such a case it is only a matter of time until it

bursts into flame by spontaneous heating. There is no doubt that a risk where cleanliness and tidiness are not strictly enforced is a risk where there is great chance of a fire breaking out. Such a risk is one of the class which 'probably will burn,' as contrasted with those superior risks which 'probably will not burn.' I am convinced that want of perfect cleanliness is the cause of many fires, and a high standard of cleanliness attained one of the best guides to us in the selection of business.

In conclusion, let me give expression to the desire we all have to strive to become more and more the competent guides of our Offices in the selection of business. We have in these Insurance Institutes an invaluable means of education to that end, and I shall be glad if I have been able to contribute something on the subject of "Jute Works" useful to our Society.

My best thanks are cordially tendered to Messrs. Urquhart, Lindsay & Company, Blackness Foundry, Dundee, the well known makers of jute machinery, who supplied me with illustrations of the machines, and to the friends who placed their experience at my disposal during the preparation of this paper.

A. D. K. BROWN.

Insurance and Actuarial Society of Glasgow,
February 9, 1903.

MANCHESTER WAREHOUSES.

THE subject of my paper this evening is one which appeals very closely to all of us in this neighbourhood; in fact, I should say that about half the buildings in the centre of the city are rateable under the Manchester Warehouse Tariff, and a considerable premium income is derived from them. I do not purpose to trouble you with the history of the evolution of the modern Manchester warehouses (some of them truly colossal) from the market stalls upon which goods were formerly exhibited by the then domestic manufacturers; nor with the details of the various Manchester Warehouse Tariffs, the first of which (dated October 21, 1842) started with a normal of 2s., with additional charges only amounting in the total to 5s. For, however interesting these dippings into the past may be, I consider the time may be better employed, as the object of my paper is to give, as far as possible, the characteristics and hazards of the present-day Manchester warehouses.

Before entering upon a consideration of the fire hazard of these warehouses, it will be as well to understand what constitutes a Manchester warehouse. To the uninitiated the term would imply a warehouse in which Manchester goods are stored; but the words have a much wider meaning in practice. A Manchester warehouse is a building occupied wholly or partly by a wholesale dealer in any class of goods (with the exception of raw cotton and other vegetable fibres and grasses) as a store for his merchandise. Retail dealers also, who, in addition to using their premises for retail purposes, sell to the trade, or use them as a store for supplying one or more of their branch establishments with goods, would bring the building under the provisions of the Manchester Warehouse Tariff. There is one other class which, as before stated, does not actually come under the heading "warehouses," but which is, nevertheless, rateable under the tariff, and that is factories occupied for the sewing or making-up of textile materials. The sewing or making-up, be it noted, must be on the

wholesale scale, and the tariff would not apply in the case of, say, a retail hosier who occupies a workroom for the sewing and making-up of shirts for his own shop only. If, on the other hand, the tenant made up shirts for the trade, the risk would be rateable under the tariff as a factory. It may not be out of place to point out that the same distinction is made in the Clothing Factories Tariff, and that the Manchester Warehouse Tariff includes within its scope all the sewing and making-up factories expressly excluded from the provisions of the Clothing Factories Tariff. Before leaving the question of the application of the tariff, I must not forget to mention that the limit of its scope is four miles from the Royal Exchange, Manchester.

All buildings coming under the tariff may be roughly divided into five classes, as follows:—

(1) Heavy Goods (*i.e.* Piece Goods) Warehouses.
(2) Light Goods (*i.e.* Drapery and Millinery Goods) Warehouses.
(3) Packing Warehouses.
(4) Omnibus Warehouses.
(5) Factories used for the sewing and making-up of textile materials.

All these various classes possess common features of hazard, while each class has characteristics peculiar to itself.

Heavy Goods Warehouses. Under this class would come buildings in which grey cloths, prints, flannels, yarns, and the like are stored. These warehouses generally possess few floor openings, as the exigencies of the trade do not require the light necessary in a drapery or millinery warehouse, often the only opening being a brick hoist with iron doors to each floor. Few or no fixtures are required, and the goods are sometimes found piled on the floor in huge stacks, often reaching right up to the ceiling, with passages between the various stacks in order to get at the different piles. It will readily be seen that in case of fire goods stored in this condition do not lend themselves so readily to the flames as a light drapery stock, those on the outside protecting the remainder, and in any case a fair salvage usually results. I think it will be generally admitted that, granted single tenancy and open situation, one of these warehouses forms the beau ideal of the Manchester manager's conception of a Manchester warehouse.

Light Goods Warehouses. Under this heading would come warehouses for drapery, millinery, and other more or less flimsy goods, and comprise what are known as "Home Trade houses." The buildings contain a large amount of shelving and counters, the goods being placed in boxes on the shelves and arranged on the counters for the inspection of intending customers, much after the style of a retail establishment. As much light as possible is necessary for the display of the goods, and it will often be found that there are one or more well-holes and/or glazed lights in the building. With all this inflammable woodwork, and considering the inflammable and damageable nature of the stock, these warehouses do not form such eligible risks as the first described.

Packing Warehouses. These buildings are occupied by a firm of packers who generally occupy the cellar as packing place and the top floor for making-up, subletting the remainder of the building in suites of rooms to various shippers. Some of these shippers do not stock goods themselves but simply occupy an office and have their goods delivered direct to the packer, who makes them up, packs and despatches them. It will generally be found, however, that each shipper has an office with one or more warerooms attached. At one time the packer invariably made his own hydraulic power, which necessitated his having a steam boiler and pumping engine; but since the Corporation laid down hydraulic mains the tendency seems to be to use Corporation power, being, I understand, more economical. In order to meet the requirements of shippers it is usual to find the various suites of rooms in packing warehouses separated simply by timber, timber and glass, or lath and plaster and glazed partitions, so that the arrangement of the rooms may be readily altered.

Omnibus Warehouses. I use this term to denote those buildings in the occupation of numerous tenants in a variety of trades, perhaps one or two only of them bringing the risk under the provisions of the Warehouse Tariff, the remainder of the building being occupied as shops, offices, and workrooms. It would be impossible in a paper of this description to analyse or even enumerate the host of trades one finds in this class of risk, including tailors, mantle-makers, shirt-makers, handkerchief-hemmers, carvers and gilders, photographers, zincographers, engravers, dye-sinkers, wood-block engravers,

printers, pattern-card makers, signwriters, umbrella makers, stick-mounters, electro-platers, etc., etc. It is needless to add that this class of risk forms one of the least desirable of Manchester warehouses. Each tenant looks after his own heating arrangements, and it is the rule to find numerous more or less securely fixed stoves. They form unsatisfactory risks, if only from the fact that the tenancies are constantly changing, and if eligible at the time of acceptance, probably twelve months hence the whole character of the risk may be altered.

Textile Factories. I now come to my last sub-division, which in the strict sense of the word are not warehouses, but which come under the provisions of the Warehouse Tariff, and are rated as such by reason of the fact that sewing and making-up of textile materials is carried on therein. They include shirtmakers, underclothing - makers, clothing factories, children's frockmakers, and the like. Some of these trades are also rateable under the Clothing Factories Tariff, but it is necessary to rate them under both, the highest rate, of course, applying. With regard to shirtmakers, underclothing-makers, and allied trades, I have found that it is the exception rather than the rule to find them in a building in their single tenancy; they usually occupy the top floor of an ordinary warehouse. The sewing machines are sometimes worked by treadle, but more generally by power, and I find that the tendency is to use electro-motors, which are, if securely fixed, the safest form of power. Small gas engines are, however, very numerous in this class of risk. Stoves (either gas or fire heated) are invariably found for heating irons and/or cooking the hands' meals; and sometimes a gas-heated calendering machine or gas-heated irons are used. An incombustible stand for the temporary deposit of the latter should always be insisted upon. The cutting out is sometimes done by hand and sometimes by machinery, the cutting being performed by a kind of band knife; but neither the latter nor the sewing machines used present any special feature of hazard. The heating and lighting arrangements taken in conjunction with the often light nature of the materials worked up, the number of hands, and the sometimes crowded state of the workrooms, form the chief features of hazard. It should, of course, be seen that the cuttings are cleared daily from off the floors. I have not considered clothing factories proper (including as they do rubber garment manufacturers), as the subject is one which should be

dealt with in a separate paper; and my remarks with regard to the other trades have been necessarily brief and general.

In the above descriptions I have endeavoured to give in a terse manner the general characteristics of each of my five types of warehouses; but it will be readily understood that comparatively few warehouses are in single tenure, and consequently we may find classes one and two combined. It will, however, be often found that where a warehouse is in the occupation of several tenants, all the tenants carry on a similar class of trade, and the building simply becomes a modification of my sub-divisions. This grouping of allied trades in warehouses is only a corollary to the fact that the two classes of warehouses (which for the sake of description I call heavy and light goods warehouses) are located in two distinct portions of the city, the light goods warehouses being on the north side of Market Street, round High Street, Cannon Street, Church Street, Oldham Street, Dale Street, etc., while the heavy goods warehouses are on the south side of Market Street, round Mosley Street, George Street, Major Street, Portland Street, Faulkner Street, Princess Street, etc. To this, like most other rules, there are numerous exceptions, but, generally speaking, the rule will be found to hold good.

There is one other type of warehouse which I have not placed under a separate heading, as there are few of them. I refer to those buildings in the occupation of some of our largest merchant firms, who, in addition to warehousing their goods in their building, manufacture certain articles for their own use, which smaller traders buy from outside sources. In this connection I cannot do better than give you one or two specific instances. In one large warehouse in the city the firm, in addition to doing their own packing and making-up and producing their own electric light, make their own packing cases and cardboard boxes, and do their own gold blocking; and in another large warehouse in the city the firm produce their own hydraulic power and electric light, do their own packing and making-up, paint their hoops for bales, emboss tickets, do their own bookbinding, and print and varnish their own tickets.

FIRE HAZARDS.

I now come to the consideration of the most important part of my subject to us as underwriters, namely, the various fire hazards to be found in warehouses. Before, however, entering upon the

consideration of the various hazards, I will, with your permission, draw your attention to the fundamental principles underlying the rating of any fire risk. The rate must cover two separate and distinct eventualities; the first is the actual hazard of a fire commencing; and the second is the danger of a fire which has already originated being accelerated by the structural conditions of the building or the nature of its contents. It will perhaps explain my meaning better if I give you an example. Take two exactly similar buildings, both of which are always kept locked up. One of them is empty, and in the other is stored potassium chlorate in wood kegs, no artificial light or heat being in either building. Now chlorate of potash is not inflammable, nor spontaneously combustible, and is only dangerous inasmuch as when heated it gives off oxygen—the great supporter of combustion. Humanly speaking, the only chance of a fire commencing is from some external cause, the chance in each case being the same. Should a fire occur in the empty building, it would probably be easily extinguished; but if the other building took fire it would probably become a total loss. No one would think of rating the buildings equally, and the difference in charge would represent the acceleration hazard, the commencing hazard being the same in both cases. Under the head of actual fire hazards would come the charges in the tariff for making-up and packing, tenancy, imperfect party walls, packing of waste, power, heating apparatus, hazardous trades, and hazardous goods; and under the head of acceleration hazards would come the charges for construction, floor openings, areas, linings, and some hazardous goods.

In considering the various hazards I shall follow the extras imposed by the tariff as being the most natural method of dealing with the subject, but shall arrange them under the two divisions before mentioned, and will first deal with the actual fire hazards. Warehouses differ from most manufacturing risks, inasmuch as the dangers to be apprehended lie in the lighting and heating arrangements, mode of construction, &c.; while in the latter the process carried on, the machinery in use, and the extent of the work, constitute the principal features of hazard.

Lighting. This is the first risk which naturally comes to one's mind when going through a warehouse. Practically all warehouses are lighted with either gas or electric light. Paraffin lamps are very rarely met with, and, speaking from memory, I have only come across one Man-

chester warehouse lighted with oil lamps. Where gas is employed the lights should be fixed in such positions that they may not be accidentally swung against goods or fixtures, and it is always desirable that the lights should have wire globe protections. In the larger warehouses in single tenancy these wire globes are almost invariably found, but in mixed tenancy warehouses they are almost as invariably neglected. The lighting up of gas lights is, I think, if anything, more hazardous than the lights themselves. In our best managed warehouses the lighting-up is done by means of electric lighters only, and none of the hands are allowed to strike matches on the premises ; but, generally speaking, the lighting-up is done by ordinary matches, with the accompanying hazards of glowing stalks being thrown on the floor, of lighted match heads flying amongst the goods, and of unused matches dropping on the floors to be subsequently trodden upon.

A well installed system of incandescent electric light is no doubt the safest mode of lighting. Arc lamps are sometimes found, and I always look upon these with a certain amount of suspicion. The globes frequently get pieces broken out (and people never seem to replace the globes while they hang together) or the metal plate at the bottom may work loose, in either of which cases the danger of sparks from the carbons falling on goods arises. In order to show that this danger is not imaginary, I may mention that my Office recently paid a loss arising from the last-named cause ; and on two occasions I have seen arc lamps, defective at the point I mention, regularly dropping white hot sparks upon the floor. The safest form of arc lighting for internal use is the doubly enclosed or high efficiency arc lamp. Inverted arc lamps are occasionally found in home trade houses for matching colours.

Heating. There are four methods of heating extensively in use in Manchester warehouses, viz., common fires, pipe stoves, gas stoves, and low pressure hot water apparatuses. It is usually found that our single tenancy warehouses are heated by low pressure hot water pipes, with, perhaps, common fires or gas stoves in the offices, and this is no doubt the safest mode of warming. The stoves or boilers for the hot water apparatuses are sometimes set in brickwork, but as often as not they are quite exposed and require the same precautions as an ordinary pipe stove.

Mixed tenancy warehouses, where, by the nature of things, the heating arrangements cannot be under the control of any one

tenant, may be heated by any or all of the above described methods. Pipe stoves as a means of heating are always more or less objectionable, and the utmost care should be taken in their fixing. The great majority of these stoves are of the slow combustion type, and the only safe method of fixing is, in my opinion, for the stove to stand on a good flagstone or set brick foundation. A sheet iron protection to a wooden floor, although occasionally adopted, is of little use, and only forms a screen to any action the stove may have on the floor. The smoke pipe to stoves should be as short as possible, and preferably of cast iron. Sheet iron pipes very soon wear thin owing to corrosion and/or heat, and there is always the danger of burning soot dropping through holes before they are discovered. By a wise enactment in the tariff the length of pipe to a stove allowed without extra charge is restricted to three feet; and (although it is sometimes difficult to convince an insured) the longer a pipe the more dangerous it is. A long pipe is made to wander with marvellous ingenuity through wood partitions and round corners, with numerous joints in it; it is difficult to clean, and the danger of firing arises; the joints work loose with obvious danger, and sometimes, in order to overcome the nuisance of escaping smoke, some of the joints are bandaged round with cloth or paper instead of being properly attended to. Care should be taken that the stoves are not fixed near wood partitions or linings to walls, as on more than one occasion I have seen these stoves red hot after being left for the night. Other pipe stoves not coming under the head "Slow Combustion Stoves" are numerous in variety of construction, and if standing on legs raising them some distance from the floor a sheet iron protection may in some cases be sufficient; but generally speaking the only efficient mode of fixing is for the stove to stand in a metal tray on a large flagstone. Common fireplaces in the actual warehouse portions of buildings are only moderately patronised, and it is often found that, while the fireplaces exist, they are not used. In such cases it should be insisted upon that they be bricked up, as goods are often stacked up against disused fireplaces, and the accidental firing of the flue (caused perhaps by the use of a fire common to the same flue but in another storey, or perhaps by some outside source) fires the goods; wood or sheet iron shields are useless against this hazard. High pressure hot water apparatuses are, in one or two rare instances, met with, but the extra imposed under the tariff

seems to have killed them. The hazard arising from them seems of a very problematical character, and in the discussion arising on the subject at one of our meetings last session no evidence could be adduced against them. To anyone interested in the matter I would recommend the reading of the paper on the subject delivered by Mr. G. V. Ryder before the Manchester Insurance Institute during the session 1877–8. This paper, which would appear to conclusively prove their danger, was written as an answer to the whitewashing of the apparatus in a paper given by Mr. Sidney Jewsbury before the same Institute in February 1877. The apparatus was condemned by the Fire Offices Committee on a report prepared in 1841 jointly by the said Mr. Ryder and Mr John Davies, a chemist. In opposition to this they are now freely allowed in private dwelling-houses and other non-tariff risks without extra charge, and our position with regard to them would seem to be illogical. Steam pipes are occasionally found, and although regarded as a safe mode of heating, are not, by the strict reading of the tariff, permissible without extra. They are, however, by common consent of the Offices, passed without penalty. A steam boiler, whether for heating or other purpose, must be fixed in a compartment outside the main walls of the warehouse, or in a fireproof compartment therein, the communication in either case being by fireproof door only. If fixed otherwise than as above the dangers of sparks from the firing place, and smouldering ashes, in conjunction with the general drying of the surrounding woodwork, arise. Gas stoves are very common, and may be divided into two classes; firstly, those in which the heat is derived purely from burning gas jets; and, secondly, those in which a Bunsen flame plays upon asbestos. The former seem to give little heat, and present no particular danger. The latter are much warmer, and in some patterns considerable heat is given off from underneath, in which case the stove should stand on flagstone.

Packer and Maker-Up.

Although there is no doubt that a warehouse in the occupation of a packer and maker-up is an inferior risk to an ordinary warehouse, it is difficult to express in writing the particular hazard attaching to same. The making-up and packing machinery is quite innocent, as is evidenced by the fact that a firm doing their own packing only is not penalised. There is, however, an air of hazard, which is at once appreciated

when seen, compared with an ordinary warehouse. The floor of the packing cellar is usually littered with waste paper, fents, and other rubbish, and the tenants of the building seem to wander therein without hindrance or restrictions as to smoking, while the hands employed in the packing and making-up are of the lower class, and more or less careless; in fact the risk presents more the traits of a manufacturing risk than a warehouse. In addition, there are numerous tenants in the building, often of foreign nationality and inveterate smokers, and the storeys are subdivided by a large amount of wood partitioning.

Plurality of Tenure. Every additional tenant in a warehouse causes an accumulation of risk, and to cover this hazard we have the charge for plurality of tenure. I cannot, however, pass over this subject without calling your attention to the inequality of this charge. A warehouse with two tenants is mulcted to the same extent as a warehouse occupied by, say, a dozen tenants; yet I think no one will argue that the former is not the better risk. The evil is a growing one, for, as you are aware, large areas formerly containing several buildings have been (and are at present being) cleared away in the centre of the city, and often one large building is erected on the site capable of accommodating an innumerable number of tenants. I would point out that in the following Warehouse Tariffs this evil is recognised, and the charge for tenancy increases with the number of tenants, viz.:—Belfast Warehouse, Boot and Shoe, Glasgow General, Hosiery, Lace, and London Manchester Warehouses.

Imperfect Party Walls. If the party walls between a warehouse and the adjoining buildings are not perfect, that is, passing through and two feet six inches above the roof, without opening therein, the building becomes subject to the risk from the adjoining premises, and an extra rate is accordingly imposed.

Power. If power is used in a warehouse, whether steam, gas, or electric, an additional rate is chargeable. The extra hazard incurred is not so much in the source of the power as in the altered character of the risk, which at once changes from a purely mercantile one to a factory risk. In support of this, power used for electric lighting, hoisting, making-up, packing, measuring, sample cutting, or driving ventilation fans, is not chargeable, all of which processes form a portion

of the ordinary routine of a warehouse. As previously mentioned, the packing and making-up in a packing house assumes more the hazard of a manufacturing risk, but this is covered by the additional charge for packer, and an ordinary warehouse doing their own packing does not evidence this accumulation of risk. If steam power is used, a boiler, of course, is necessary, and if this latter is not fixed in accordance with our views of security as previously set forth, an extra rate is incurred in addition to the charge for power. Gas engines should have their exhaust boxes and pipes fixed clear of woodwork, but otherwise would not seem to present any particular features of hazard. Electro-motors (a source of power becoming more popular every day) should be enclosed in a metal case, preferably forming part of their designed construction, and, of course, all the usual installation precautions taken. Electrical manufacturers seem to have appreciated our requirements, and I find that practically all newly installed motors are armoured.

Hazardous Goods.

Warehouses are sometimes found wholly or partially occupied by tenants whose trade necessitates the use or storage of mineral or wood spirits, turpentine, and other hazardous goods, the obvious dangers of which it is needless for me to dwell upon. These goods are divided under two heads; the first containing highly volatile and inflammable liquids, the use or storage of which, even in small quantities, involves considerable hazard, and the charge arising under this head is exigible whether the goods are deposited as merchandise or otherwise; while the second head contains those articles which, while highly inflammable, are not so easily ignited as the first group, or which are simply supporters of combustion, and the storage of these for the tenants' own use is allowed without extra; but, of course, if they are kept as merchandise they become chargeable.

Hazardous Trades.

Several more or less hazardous trades are enumerated in the Tariff, the whole or partial occupation of a warehouse by any of which necessitates the submitting of such case for the adjudication of the Fire Offices Committee. The extra hazard involved in these trades is so variable that it is impossible to have any fixed charge; sometimes the extra imposed is large, and in other cases it is possible to let them off without any extra. There is one exception to this rule, and that is in the case of a

printer by power, for which risk it has been possible to charge a fixed extra.

Packing of Cotton Waste. We have an item in the Tariff relating to the packing or pressing of cotton waste. I cannot help thinking that this charge is practically obsolete, as I have only come across one case where the charge applied, and in this instance only a little extra pressure was applied to bales already made at the firm's separate waste warehouse; but I shall be glad to be corrected if I am in error. I had occasion not long ago to inspect a risk occupied by a waste packer, with numerous cotton waste merchants as sub-tenants, but I have only been able to trace the one ordinary warehouse above-mentioned used for this purpose. The palpable hazard of the handling in bulk of cotton waste need not be dwelt upon.

Faulty Construction. Large numbers of our warehouses, especially those in confined situations, have their rear and/or side walls constructed of timber and glass, iron and glass, or other such flimsy materials, while in other cases an extra storey is added to the building constructed wholly or partly of timber, or timber and glass. The objection to this mode of architecture is obvious, and forms a danger under both my divisions of risk. It forms a commencing hazard owing to the ready way in which it lends itself to the spread of fire from contiguous risks; and an acceleration hazard, as it leads to the rapid spread of a fire from floor to floor, and in addition weakens the structure and renders it more likely to collapse.

This completes the commencing hazards, and I will now draw your attention for a few minutes to the acceleration risks.

Floor Openings. Apart from staircases, it is often necessary to have communication between the various floors, either for the handling of goods or for the sake of light, and of course these openings present a ready means for the spread of fire. The openings are of various kinds, comprising hoists, ventilation tubes, glazed lights, trap doors, and well holes. *Hoists* constructed entirely of brick or stone with a fireproof door to every opening are allowed without the charge, but if they are not so protected they act as a large flue, drawing the flames from floor to floor; and, of course, if a hoist is constructed of timber the danger is accentuated. *Ventilation tubes* present a similar danger; but I may say they are rarely met with. *Glazed lights*

in the floors of a warehouse are a common feature, and although they are not in the literal sense floor openings, the glass so readily breaks in case of fire that they are swiftly converted into such, and are penalised accordingly. It is sometimes found that instead of having a hoist the warehouseman employs an internal teagle with *trap doors* in each floor to allow the passage of goods, and in addition trap doors are used for numerous other purposes. *Well-holes* through one or more floors are fairly common features, especially in our larger buildings and in home trade houses, the object being to obtain as much light as possible, and this form of floor opening is without doubt the most hazardous. I cannot leave this question of openings without drawing your attention to our inconsistency with regard to same. An open staircase is allowed without extra, although it presents as much danger as a well-hole; and under practically all the other warehouse tariffs making a charge for openings (including the Boot and Shoe, Hosiery, Lace, and London Manchester Warehouses Tariffs) such a staircase would be punished. Even if we insisted on staircases being enclosed in lath and plaster walls it would be some protection, but our present method of dealing with them is quite anomalous; and it is sometimes difficult to argue with a man when he points out that we charge him an extra for every trap door after the first, which doors, he assures us, are as a rule kept closed, and yet we allow him to have an open staircase. So far, indeed, has this exception been extended that we have several warehouses in our midst which have large and dangerous well-holes through the floors, but because a staircase is fixed round the sides —still leaving a large part open—the extra charge is not imposed.

Areas. In the building of Manchester warehouses one of the main considerations, as previously stated, is to obtain as much light as possible, and the larger the floor area the more difficult the problem becomes; and in addition to the devices already mentioned, the area is another form of obtaining light. Areas are divided into two classes, viz.:—(1) Internal areas, that is formed by the walls of the risk itself; and (2) areas common to other warehouses. These areas are sub-divided into two divisions—perfect and faulty. To come under the former sub-division *all* the walls of the area must be constructed solely of solid masonry. If the walls, or any portion of the walls, are not so constructed, the area comes under the second sub-division, the common materials used in this class being

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timber and glass, iron and glass, or lath and plaster—perhaps covered on one or both sides with tiles. The danger of these areas is obvious, the flames passing through the windows and being drawn by the draught created from one floor to another, and in addition, in the case of common areas, from one warehouse to another; and in the case of a faultily constructed area the danger is accentuated. An apt illustration of this hazard is found in the case of the recent fire at Messrs. Richardson, Tee, Ryecroft's warehouse in Portland Street, Manchester, in which case the fire started in, I think, the second floor, but was quickly transferred to the upper floors by a large faulty area in the centre of the building, and I found from observations during the fire, and afterwards from an inspection of the building during salvage operations, that the fire had burnt much more fiercely in the upper floors than in the floor upon which it actually commenced. Gentlemen, I am about to venture upon very delicate ground, and try to give a definition of an area, but I enter upon the subject with trepidation. Roughly speaking an area is a space or void enclosed by three or more walls of one or more warehouses. It is not necessary that this space should start from the bottom of the building, and in many instances areas only commence above the ground floor, which usually has a glazed roof under the area. Before leaving the question of areas, I would draw your attention to, and ask your consideration of, the wording of the Tariff with regard to common areas, viz.:—"If having any window or opening into an area (internal or otherwise) into which any other *warehouse* has a window or opening." Now suppose we have a warehouse with two walls to an area formed on the third side by a building not rateable under the Tariff, this area would not be chargeable, although in principle it is quite as dangerous to the warehouse itself as if the other building were a warehouse. I cannot see any reason in this anomaly, which would be obviated by the substitution of the word "building" for "warehouse"; nor can I commend the practice of the Offices to pass without extra obvious areas which may through accident, or in many modern instances design, have a street name attached.

Linings. Linings to the walls or ceilings of a warehouse are often met with, and may be divided into two classes—wood and canvas, the latter sometimes being covered with paper. A canvas lining to a ceiling is usually nailed to the beams, and if it breaks away from the nails there is

always the danger of it falling near to, or coming in contact with, gas jets. In addition, should a fire commence from any other cause, a canvas lining acts like a train of gunpowder, running a fire (which otherwise might have been only local and easily extinguished) all over the storey. Wooden linings to walls or ceilings (which by-the-bye are practically always made of pitch pine, one of the most inflammable of woods) are invariably fixed with a more or less pronounced air space at the back, and consequently, in addition to providing additional fuel to a fire, possess the danger that a fire may burn at both sides, one of which is practically inaccessible.

This concludes my brief summary of the particular hazards legislated for in the Tariff, which latter, taken as a whole, is very complete; but of course there are numerous hazards attaching to the hundred and one trades which one comes across in conjunction with Manchester warehouses, the consideration of which it would be impossible to enter upon to-night. The nature of the goods stored in a building has a considerable bearing on the risk; but it has not been found possible to discriminate in the rating of the buildings (except in the case of specially hazardous goods), and our approval or disapproval can only be signified in our retentions. There are two points of risk which, however, are not touched upon in the Tariff, and upon which I hold a very strong opinion, and on which I would specially ask for discussion this evening, viz., size, or in other words cubical contents* and height. The two dangers are quite distinct, and I will analyse them separately.

Size. As I have previously emphasised, large buildings are on the increase, and I have given it as my proposition that the main dangers to be apprehended in a purely warehouse risk are from the lighting and heating arrangements, and by natural inference it follows that each gas light, fireplace, stove, length of steam pipe, &c., possesses a potential danger which only requires a small accident to commence a fire, and if only for this reason a large warehouse is more dangerous than a small one. But this is only one phase of the question; for in a large warehouse a fire starting after closing time, in perhaps the centre of a large floor area, is not so easily detected nor so easily assailed from the outside; and last, but not least, the vast amount of damage capable of being caused by a single fire in some of our largest warehouses is appalling.

* Since the preparation of this paper the tariff has been altered on this point.

Height. The normal height of an old warehouse was four storeys, but in our modern buildings five and six storeys are common, and seven or eight storeys not exceptional. Now our insurance experience teaches us that a storeyed building is more dangerous than a shed, and that each additional storey forms an accumulation of risk. A fire starting on the top floor of a seven storey building is very inaccessible, and the reaching by, and direction of, water jets becomes more difficult as the height of a building increases. The walls of a high building are more liable to collapse; and although it may be regarded as a side issue, it is possible that the efforts of the firemen, in case of fire, may perforce be directed to the saving of life from upper storeys, when, from an Insurance point of view, it might be more profitably spent in attacking the fire in those golden moments of its infancy.

Large buildings are the sign of the times, and the high price of land in the centre of the city induces owners when erecting new buildings to add an additional storey or two, in order to increase the rental. If we made a charge for these hazards we should not be at all singular, for in practically all the other Warehouse Tariffs, cubical contents or height, and in some cases both, are charged for. Cubical contents are charged under The Bonded Stores (Scotland), Flax Warehouses (Scotland), Glasgow Mercantile, Glasgow General, Leith and Granton, London Manchester Warehouses, and Woollen Warehouses Tariffs; and height under the Bonded Stores (Scotland), Bristol and Gloucester, Cold Storage, Hosiery, Lace, Leith and Granton, and Woollen Warehouses Tariffs. It will be noticed that both cubical contents and height are charged under three of the Tariffs.

Construction. A comparison of the construction of the present-day warehouses with that of our older warehouses will be interesting, and I do not think that in all respects it will be in favour of the former. Our older warehouses, which are found about Cannon Street, New Cannon Street, George Street, Faulkner Street, etc., are mostly plain buildings constructed mainly of brick, the floors being carried on wood beams and joists, and the floor area being comparatively small the beams simply rest on the external walls without intermediate support. Our modern warehouses are more substantially built, but often the materials used are not so unaffected by fire. Stonework seems to impart a bolder front to a

building, and has been pretty extensively used in warehouse architecture: but stonework has a tendency to crack and chip when subjected to great heat, and is consequently inferior to brick. I have seen the theory advanced that those materials which in their manufacture are subjected to great heat, stand best the ravages of fire. Terra cotta, which along with brick, answers this requirement, has lately been pretty extensively used, and deserves encouragement. Iron beams with iron stanchions seem to have completely superseded the old wood beams, and their well known building-wrecking powers need no emphasis. A fire expands them, and during brigade operations they are constantly being alternately cooled and heated with a consequent pushing and tugging on the walls, which ultimately leads to collapse. There is no doubt that if constructional ironwork is protected with a covering of brick, concrete, or other similar substances, a great improvement is made; and we find an extra charge imposed under the London Manchester Warehouse Tariff, "If there be any structural ironwork (including columns) not covered with brick, plaster, or cement at least three quarters of an inch thick," and I think the charge is one which might well be extended to Manchester warehouses.

Appliances. In comparatively few Manchester warehouse is any pretence of supplying extinguishing appliances made. It is necessary in order to obtain any allowance whatever, that the building should be sprinklered, in addition to having such other appliance as would entitle the Insured to an allowance of 10 per cent. under the ordinary scale. I think the splinklered warehouses in our midst might be counted on the fingers. This may be accounted for by the fact that Manchester warehouses are a class of risk which do not lend themselves so readily to the provision of appliances as some manufacturing risks; for the great majority of warehouses are not in single tenure, which is practically necessary for an efficient system of appliances. Then, again, the discount allowed is small in comparison to the expense of fitting. In a few instances one finds a system of buckets, and, in rarer cases still, hydrants and hose piping; but, as stated previously, no allowance can be made for them by themselves.

Automatic Alarms. It is an axiom that an early call to the Fire Brigade is half the battle. There have been numerous automatic alarms brought upon the market with more or less success, but we had a demonstration last Session before the Manchester Insurance Institute of an automatic alarm which seemed almost perfect in its details, and has the recommendation that it is extensively in use in our Antipodes, and consequently does not come to us as an experiment. It seems to me that an efficient automatic alarm, with direct connection to the Fire Station, is especially adapted to warehouse risks in large cities with good brigades, and it is probably superior to extinguishing appliances (with the exception of sprinklers) as it is efficacious at *all* hours, while appliances are only effective during business hours. Our experience shows that the majority of fires originate after closing, and probably some of our largest fires might have been restricted to small losses had the Fire Brigade received an automatic call at the commencement of the fire. The alarm to which I have made reference not only advises the Fire Brigade, but indicates the floor or room in which the fire is burning, which is of great aid to rapid extinction. As showing the rapidity with which the brigade turn out, I may mention that a gentleman of my acquaintance was recently at the Manchester Chief Fire Station when a call was received, and, pulling out his watch, he timed the brigade, and found that it was only thirty-eight seconds between the call and the first detachment passing through the gates of the station. I will go as far as to say that an efficient automatic alarm, connected with the Fire Station, might be encouraged by the allowance of a small discount.

Conclusion. Although I stated at the commencement of my paper that the Manchester Warehouse Tariff applied to warehouses for any class of goods, it will have been noticed that I have confined my remarks generally to "Manchester Goods" warehouses. I have found it difficult to decide what to include and what to leave out, for it cannot be denied that a large premium income is derived from warehouses not coming under the above category, for, broadly speaking, they are the higher rated buildings, and include ironmongery, furniture, grocery and provisions, paper, stationery, toy and fancy goods, jewellery and cutlery, drysaltery, etc., warehouses, each class possessing its own distinctive features and hazards,

some of which often require the most careful analysis. I have also steered clear of the discussion of even the commoner trades found in warehouses, such as printers, for were I to enter upon the consideration of the specific dangers attaching to each, it would take a week or so instead of the portion of an evening at my disposal.

This paper was written over a year ago, at which time a paper was expected from another member of the Association on "Exposure Hazard," and as I did not wish to anticipate anything he had to say I purposely omitted any reference to this in connection with Manchester warehouses, although it is a very important point to consider in our confined areas. It may be interesting for me to state, however, that in one of the old Manchester Warehouse Tariffs a charge was made if the building fronted to a street less than 25 feet wide, but for some reason the charge was dropped, which seems to me a pity.

Fires. During the fifteen years ending December 1900 there have been 117 fires, involving losses of £100 or over, caused as follows:—

12 or	10·2	per cent.	by defective flues or hearths.
10 or	8·6	„	spread from adjoining premises.
10 or	8·6	„	by lighting arrangements or lighting-up.
5 or	4·3	„	by smoking.
4 or	3·4	„	by sparks or soot dropping down from disused flues.
3 or	2·5	„	by incendiaries.
4 or	3·4	„	by miscellaneous causes.
69 or	59	„	While the cause of was unknown.
117 or	100	per cent.	

I have not been able to ascertain tho time of starting of all the fires, but of the 63 cases of which I have a note I find that 16 started between the hours of 8 a.m. and 6 p.m., and 47 between the hours of 6 p.m. and 8 a.m. It is difficult to compare the times of starting of warehouse fires, for unlike manufacturing risks which have certain specified working hours, different warehouses have different hours, while a large amount of overtime is worked, and it does not do to assume that a fire starting at, say, 9 p.m. commenced when the building was closed up. I have thought it, however, a fair average to take the working

hours as 8 a.m. to 6 p.m., and on this assumption it appears that 74 per cent. of the fires started after closing time, and it is significant that 25 (or 53 per cent.) of these after hours fires started within three hours after closing, viz., between 6 and 9 p.m.

With regard to the time of the year the fires occurred I find that 63 occurred in the five months October to end of February, and 48 during the seven months March to end of September, and it may be interesting to know that the largest number of fires occurred in the month of November.

J. W. K. SCHOFIELD.

Insurance Association of Manchester,
December 3, 1902.

TIMBER YARDS.

To confine oneself simply to the consideration of the matters suggested by the heading of this paper would be to ignore a golden opportunity of gaining some knowledge of one of the principal trades of the country. The importance of timber as an article of commerce is undeniable when one considers the multitudinous uses to which it is put (ranging from kindling a fire to building a ship), and that for the majority of these uses no adequate substitute has yet been discovered. But apart from their direct utility in producing commercial articles (of which there are many in addition to timber) science has demonstrated beyond a doubt that trees exercise a vast influence upon the economic conditions of this planet, mainly by the proper mitigation of the extremes of heat and cold, the preservation of the stability of the soil, and the regulation of moisture. Some authorities even go so far as to assert that the decadence of many great nations is traceable to the destruction—or rather non-preservation—of the forests of their countries. Be that as it may, it is now generally recognised that the science of forestry, or the proper conservation of a sufficient percentage of wooded area, is of vital importance to mankind, and the question engages the attention of the legislatures of most civilized lands.

Of the immense number of species of trees known to man, comparatively few are known to commerce. And we have not far to seek for a reason. Most timber being used for architectural and constructive work, it naturally follows that large quantities of certain kinds of wood are required, rather than a variety. I will, therefore, invite your attention for a few minutes to the trade done by this country in these woods, to the principal centres of importation, and to our chief sources of supply.

The chief commercial trees known in Great Britain, and a few of their characteristics and uses, are as follows:—

Baltic Redwood.—Called "Yellow Deal" in its rough state.
Perhaps the most generally useful of all, as it supplies wood

for roofing, flooring, paving, and internal and external woodwork of better class houses.

American Yellow Pine, or "White Pine" as it is termed in its native country. It is scarcely suited for external work, and is used chiefly for joiner work of buildings, parts of furniture, etc.

Baltic Whitewood.—An inferior wood, cheaper than, and used as a substitute for, Baltic Redwood, for joists, flooring, etc.

American Pitch Pine.—An important timber, heavy, and highly resinous, but not easily worked. Well adapted for open roofs, fittings of churches and halls, and such like work.

Douglas or Oregon Pine.—From north-west America. A special feature of which is the great lengths to be obtained without knots, making it very useful for masts and spars.

Californian Redwood.—Somewhat similarly adapted to last for usage, but with the peculiarity of being rather difficult to cut across the grain.

Kauri Pine.—Of New Zealand. Another long wood for mast making, but with a tendency to warp.

Yellow Pine.—From the Eastern States of America.

Oak.—Used for shipbuilding, civil architecture, and furniture. Oak, however, is said to rust iron.

Teak has the opposite effect upon iron, and is, therefore, in demand for the backing for armour plates of vessels, besides being used for other purposes in shipbuilding, and in architecture.

Elm.—A timber of great durability even if kept constantly wet, and so used a great deal in keels of vessels.

Greenheart.—A wood of extraordinary strength, and heavier than water, much used in shipbuilding.

Lignum Vitæ.—Nearest to a strong metal in resistance to wear and tear.

Mahogany and Ebony.—The latter a very close-grained wood; both very valuable and used for furniture and ornamental work. The mahogany tree grows to an enormous size in Africa.

There are innumerable other woods, such as deodar, walnut, lime, rose, sandal wood, and palm, which are imported, but in smaller quantities, and time will not permit of more than merely mentioning them.

The most useful woods obtained as yet come from north

temperate regions, but they are diminishing. Some of the tropical timbers, however, are strong and possess many valuable properties which will ultimately bring them into use for more general purposes than at present.

I believe I am correct in saying that this is the largest timber importing country in the world, which of course is due to the smallness of our internal supply. Whilst the population of Great Britain increased by twenty per cent. in the decade ending 1900, the timber imports increased by no less than forty-five per cent. in the same period. In 1902, the total of hewn and sawn timber imported into the United Kingdom was 9,487,721 loads, an increase of more than 400,000 over 1901, and its value is estimated at £23,277,114 which, however, is some quarter of a million less than 1901. These imports are summarized as follows:—

	LOADS.
Colonial deals, battens, etc.	1,639,668
Colonial timber and hardwoods	78,917
Foreign deals, battens and boards .. .	5,037,058
Foreign timber and hardwood	2,732,078
	9,487,721
All in addition to Colonial and Foreign Staves	120,019
	9,607,740

The trade is carried on more or less in all ports in the Kingdom, but I can only glance at the figures of a few of them to give some idea of the distribution of the trade. I may premise by saying that many of them show an increase over 1901, but very few over the figures of 1900, in which year the high water mark of the trade appears to have been reached.

One naturally looks to London for the largest figures, and the total is 1,784,527 loads. Cardiff stands next with 979,636 loads; followed by Hull with 807,088 loads. Liverpool imported 675,549 loads, and we may here remark that Liverpool is probably the chief market of the world for mahogany, which it also exports. Manchester, though only opened out as a seaport in 1894, has made rapid strides in the timber trade, and in 1902 imported no less than 329,187 loads, and appearances point to it maintaining its position as one of the chief distributing centres in the country.

In Scotland, Glasgow and Grangemouth head the list with 277,979 loads, and 241,817 loads respectively; and in Ireland, Belfast has the largest business with 132,611 loads, no other port reaching six figures.

Turning to our local returns, the Hartlepools hold the honourable position of fifth port in the Kingdom with 477,322 loads, an increase over the previous year which is mainly ascribed to pit-props. Newcastle and North and South Shields, representing the Tyne, account for well over 300,000 loads, but, rather remarkably, show a decrease in pit wood. Sunderland had 121,548 loads, also a decrease in pit wood, and it may be noted that not a single cargo of teak or lathwood entered that port during 1901. The Tees trade is comparatively unimportant, and only totals some 48,000 loads.

Our supply of timber was drawn from the following countries:—

	LOADS.
Norway and Sweden	2,998,495
Russia	2,557,527
United States of America	774,233
Canada	1,718,585
Germany (Hewn only)	222,697
Other Countries	1,216,184
	9,487,721

Norway and Sweden.—It will be noticed that the largest quantity comes from Norway and Sweden. These countries are abundantly wooded, the principal trees being firs and birch, which grow to a large size. The more southern districts have a great variety of hardwood. About fifty-four per cent. of the quantity of timber exported reaches this country.

Russia, including Finland, follows closely upon Norway and Sweden in quantity, and sends us about sixty-three per cent. of its exports. This country is chiefly remarkable for the inequality of the distribution of forests. Firs and larch form the staple trade of Russia, but in central and southern provinces there are also good forests of oak, beech, ash, etc.

Canada comes next on the list, with United States of America nearly a million loads behind. It may be here mentioned that the continent of America is the division of the earth most

thickly wooded with primeval forest, and possesses an immense variety of trees. Canada has a very large export trade, but the States' exports now about equal the imports, owing to the indiscriminate felling of trees in past years.

Germany is low down on the list, and each year the home requirements more nearly approach the supply, consequently the export trade is decreasing.

Austria-Hungary possesses vast tracts of forests of the most useful timbers, and it is said the oak produced by the two provinces of Croatia and Slavonia is probably without an equal in the entire world. Our trade with this empire is at present insignificant, but reports from the various centres are favourable to the woods, and efforts are being made to develop the trade, as our merchants are becoming alive to the fact that diminishing supplies from other countries may be supplemented from this source, hitherto practically untapped by us. It is to be hoped that these efforts will be successful, as the question of maintaining our timber supplies is one of serious import.

As regards the home-grown timber trade, I find that no statistics are available, but, in proportion to that imported, the quantity produced would be found to be small. In view of the vast consumption of timber in this country it is much to be regretted that Parliament has not given the question of home supply the consideration it deserves, for whilst Britain ranks as one of the most sparsely wooded countries in Europe it will be a surprise to many of you to hear that if, out of 12,000,000 acres of waste land, and 12,500,000 acres of mountain and heath land used for light grazing, only five per cent. were put under forest cultivation, it would produce no less than ninety-five per cent. of the total wood imported, which is calculated to be all that could be grown in Great Britain. There are many reasons for this, into which it is hardly within the scope of this paper to enquire, but, owing to nature of climate and the absence of extremes of cold and heat, a great variety of trees could be successfully cultivated in this country, and yet so little is this fact appreciated, that, according to one writer, we are hastening to a timber famine at lightning speed. Our principal timber producing trees are oak, ash, elm, and beech. For ash there is a very great demand, and the home supply is decreasing in consequence. The coniferous trees of Great Britain are also important, but we find a great

drawback to the cultivation of larch is that it is subject to a disease which soon destroys the commercial value of a whole plantation if not discovered in time.

The question of the storage of the vast quantity of timber that comes into Great Britain is an important one. The dock owners all set apart large areas of ground for the purpose, in some places extending to many acres. Portions of these grounds are retained by the companies, who charge rent to the merchants according to the length of time the timber has remained, but the largest portions are rented by merchants for their own exclusive use. These private grounds are seldom fenced round, and are only known by the tenants' signboards, the most usual boundaries being railway lines. Railway lines are also found again sub-dividing the different grounds. The majority of merchants have also private yards, frequently attached to sawmill premises, and surrounded by wooden palings, into which also one or more lines of railway run. Of course, much valuable timber is placed in public warehouses, but it is not our intention to consider this class of risk to-night.

The question of seasoning follows as a natural sequence to that of storing, and the one very properly is joined with the other.

The correct time to fell trees is winter, as at that season of the year they contain the minimum quantity of natural sap required for growth, and they should be removed from the ground as soon as possible to prevent absorption of any further moisture. It would be superfluous to explain why the expulsion of moisture from wood is a necessity, as the reasons are too well known, but with this view, timber is usually piled horizontally in yards with small laths or fillets between each piece, to allow a free circulation of air, and so induce a natural process of drying by evaporation. Much timber (more especially of the more valuable kind) is protected from the weather by slate, wood, or corrugated iron roofs, the sides (if any) of the sheds being generally open weather-boarding, but in many cases the timber is only covered by matting or fibre, or it may be left without any cover at all. Planks are frequently stacked vertically or obliquely on racks or "horses," each plank kept a little apart from the next.

Most ordinary woods require about twelve months to become properly seasoned, though some are ready sooner than others.

While it must be admitted that natural seasoning of wood is best, it is an extensive practice to hasten it by artificial means, *i.e.*,

steam or hot water pipes in properly constructed drying rooms, or on flooring over boilers. These places, however, are almost always adjuncts of sawmills, and I therefore pass them over without further comment.

In most, if not all, timber yards there is a sawmill, that is, a mill in which sawing only is done, and no planing or moulding. In private yards these mills may be of substantial brick and slated construction, but on rented ground they are more likely to be of timber. The machines used consist of one or more log frames, circular saws, cross-cut saws, and horizontal saws of various sizes and speeds.

The Fire Hazard of Timber yards opens up a wide field for consideration, and so many are the points that we can only hope that none are overlooked. We naturally turn first to the sawmill, if there is one. As already mentioned, the construction of mills on rented ground is generally of an objectionable, temporary character, and we often have the additional severe hazard of a steam boiler inside, or in a communicating building of similar construction. We can also estimate to a certain extent, from the management shown inside of the mill, whether a reasonable amount of care and supervision will be exercised in the yards.

Whether the present minimum rates imposed by the Tariff for these mill risks is sufficient, is a point open to question. Personally, I am in favour of a graduated scale of charges, which might be made to depend on construction, number of machines, and nature and position of power, &c.

The refuse to be found in timber yards forms one of the most serious elements of danger, and one upon which too much stress cannot be laid. Much sawing, both by hand and by portable saws (to the latter of which I will refer again), is done in the open yards, and, there being no warranty on the policies as to their removal, the shavings and sawdust are allowed to accumulate. To these must be added chips, bark from pit props and other unsawn timber, broken fillets, pieces of greasy waste, and an endless variety of odds and ends that find their way into these places in an unaccountable fashion, all of which together, and especially in a dry season, form a glorious medium for the inception and spread of fire. And how easily this might be minimised, if the Insurance Companies insisted upon a systematic clearing of rubbish from the yards, as they do from the mills.

The presence of this rubbish, and of matting and fibre (when

used), adds considerably to the risk from locomotives, which, as I have already shown, are to be found travelling about timber grounds and yards. This risk arises both from sparks and ashes, and I should certainly like to see a rule made that all locomotives travelling in timber yards must be provided with spark catchers and receptacles for ashes. As closely allied to locomotives we may mention steam cranes travelling on railways, and in some yards there are also steam overhead travelling cranes. For these the Liverpool Salvage Committee have issued an excellent set of rules, which might with advantage be adopted for such cranes in all timber yards and non-fireproof buildings. Somewhat abbreviated, they are as follows:—

1. The engine and boiler to be completely enclosed in metal shelter, the frame and base being also of metal.
2. The boiler to stand inside a deep metal ashbox, which must be jacketed and kept filled with water.
3. The funnel to have a metal bonnet of prescribed size and shape, besides the further protection of a metal plate above the funnel when inside the building.
4. The steam to be exhausted independently, *i.e.*, not into the smoke funnel.
5. Metal receptacles to be provided for spent ashes and cinders, besides a special place for emptying same.
6. Coke only to be used as fuel.
7. A cask or cistern, containing at least sixty gallons of water, and a bucket, to be carried in the cab of the crane.
8. The crane to be in charge of a competent person, who is to be constantly in attendance from the time the fire is lighted until it is properly extinguished.

Again referring to the portable saw-bench, the more extended use of electricity as a power medium has in this added another possible hazard. This saw-bench travels on wheels and is taken about the yard, as being more easily moved than heavy pieces of timber. Attached are the motor and switches, etc., enclosed in sheet-metal boxes, the important point being to see that these boxes have no openings left through which sparks can fall upon inflammable goods or refuse. The current is obtained by long flexible wires, which are connected to plugs in adjacent buildings, or on posts carrying overhead conductors, and these connections are also points of danger to be carefully inspected.

The fact of so much timber storing ground being unfenced and easy of access provides a source of danger that is difficult to estimate. I refer to tramps, roughs, card-players, and others who make resorts of these places after the workmen have left. How many fires have been caused, either wilfully or through carelessness, by these gentry, it is impossible to say, and this risk can only be guarded against by very careful watching and the adoption of stringent measures.

Congestion of risk is a most important point to be taken into account. In country places, where land is cheap, the timber yards are frequently of such area that the timber is sufficiently spread to make it a comparatively easy matter to confine a fire within narrow limits; but as we get to more populous districts, and then to large cities, we find that the land becomes more costly and the timber is confined in much smaller spaces; and in places it is piled so closely together and to such great heights that heavy damage is almost a certainty, should a fire once break out. The risk of "surroundings" also comes in here with great force, as workshops, mills, or warehouses, or other timber yards, may be in close proximity, and will form additional elements of danger.

As regards timber itself, the facility with which it burns depends upon the nature of the wood, size, and system of piling. Heavy balks, or large piles of closely packed smaller wood, will not readily consume, and a salvage may be looked for in other than exceptional cases. Pit props, which are so largely dealt in at the North-East ports, burn easily, which may be owing to the resinous nature of the wood and to the system of piling them in transverse rows, their shape (circular) allowing free access to air.

The question of fire appliances is one of great moment, and we find that many large dock or railway companies have systems of water-pipes and hydrants over all of their premises, with well organised brigades, thoroughly equipped. Merchants are also becoming alive to the advantages of efficient fire appliances, and many private timber yards are now protected.

The excellence of the "zone" system of rating adopted in the Timber Tariff is beyond controversy, and it is to be noted that the tariff also admits the advantage of having "cut-offs" between zones by allowing reduced rates where they are divided by brick walls; but I have often thought it a question worthy of consideration whether some re-arrangement of the rates could be made, allowing for where the different zones were marked by open spaces of

stipulated width, and charging more for where there is no actual separation of the timber. There is no doubt whatever that these spaces would facilitate coping with fires, and would probably admit of more timber being salved. I might here state that, whilst the presence of locomotives must clearly be considered as a fire hazard, the intersecting railway lines make excellent cut-offs, the open spaces enabling fires to be more easily controlled and kept within narrower bounds.

I will conclude this section of my paper by giving a few technical particulars.

A *load* of timber is 50 cubic feet, and is the standard of measurement in Great Britain. In other countries the standards vary considerably.

Strength of timber varies within wide limits. It differs with the age of the tree, the conditions of growth, the part of the tree from which it is cut, the amount of seasoning, etc.

The *specific gravities* of the best known and most used woods are:—

Ebony	1·19
Greenheart	1·05
Teak	·98
Oak	·93
Mahogany	·85
Ash	·75
Pitch Pine	·70
Beech	·68
Elm	·55
Red Pine	·54
Fir	·53

Whilst I find some disparity of opinion as to what may be called "balk," "squared," and "round" timber, we are not far out of it if we include under these terms nothing measuring under 9″ × 9″, and 12′ in length.

"Deals," "battens," and "boards" are terms applied to different sizes of cut timber, less than that quoted, boards being, say, of 2″ and less in thickness.

Wood, as is universally known, is subject to deterioration under the influence of air, earth, and water, therefore means have been adopted, and with a large measure of success, to preserve it. The aim being to expel the sap and replace it by some

antiseptic matter to prevent putrefaction, such as creosote, corrosive sublimate, chloride of zinc, sulphate of copper, etc. Of these modes of preservation I will only mention creosoting as being most common, and as the others are practically the same process with different chemicals.

"Creasote," "Creosote," or "Kreasote," is from two Greek words meaning, literally, "flesh" and "to preserve." It is the product of the distillation of wood tar, more especially tar from beech wood, and least of all from the wood of conifers, the tar from which contains very little. It has a strong odour and a hot taste, is a non-conductor of electricity, and burns readily with a smoky flame. Boiling point 397° Fahr., but remains liquid at — 16·6° Fahr. It is soluble in ether, carbon disulphide, alcohol, and in 80 parts volume of water. A powerful antiseptic, it is specially adapted for preservation, but it is also put to numerous other uses, such as curing of fish and hams, and as an ingredient in various medicines. Our principal supplies are brought from Archangel, Stockholm, and America.

So-called coal tar creosote is more or less impure carbolic acid.

The mode of procedure is simple, and can be described very briefly. The timber is placed in iron horizontal cylinders of varying lengths, which are then closed and made air tight. A vacuum is then formed in the cylinders which exhausts all moisture from the wood, and afterwards the creosote is forced in at a pressure of about 120 lbs. to the square inch. The cylinders are usually in the open, with the creosote storage tanks under the ground beneath and near. The engines and pumps are in houses often built of timber, adjoining, and perhaps built partly over a cylinder. If steam power be used there may be a boiler in a house or in the open near, or the steam may be brought from the saw-mill boiler.

About two-thirds of a gallon of creosote is used to the cubic foot for large-sized timber, but for smaller scantlings, where there is a greater proportion of surface, this is increased to about one gallon to the cubic foot.

By the process above mentioned the creosote is said to be forced to the very heart of the timber, but, as the denser and more valuable portion of the preservative is near the surface, it is recommended that the timber be cut to the required sizes before, in preference to after, being put through the cylinders.

A system of preserving timber quite different to the foregoing is that of "Haskinizing" (so called after its inventor or discoverer, Col. Haskin, of the United States of America) or "vulcanizing." To appearances the operations are about the same, but in this, instead of being chemically treated, the timber is subjected to a high temperature under several atmospheric pressures, and the effect is to coagulate the sap, which then becomes a natural preservative. This high temperature, ranging from 300° to 400° Fahr., is, it is claimed, sufficient to destroy the tendency to germinate, and to kill all fungi, germs, and insect life in the wood, and also to produce a greatly increased percentage of antiseptic and preservative matter. What takes place might be described as a re-arrangement of the constituents of the wood, and by the high pressure employed, which permeates the entire wood, evaporation or bubbling of the essential oils is entirely prevented. This re-arrangement, it is said, whilst increasing the "life" of the wood, does not destroy its characteristics for usage, nor is it necessary to cut it into lengths before treatment.

Before removing the wood from the cylinder it is allowed to cool down under the same pressure, with the result that the new compound arising from the heating of the natural fluids in the wood is consolidated with its fibre, thus indurating, strengthening, and preserving the wood.

From this description it will be seen that the success of the process of "Haskinizing" greatly depends on the use of "green" timber, owing to the greater amount of natural sap in it, and this has the advantage of obviating the necessity of keeping large stocks of timber in seasoning. Haskinized timber is perhaps a little lighter than untreated wood, but it is certainly harder and stronger, and seasons in about one-twelfth of the time. As to its behaviour under fire, experiments show that, while it ignites as readily as ordinary wood, it really retards fire, as it burns or consumes very slowly.

The so-called fireproofing of wood is a matter I should like to touch upon, though I can only do so slightly, as it is a subject of sufficient width to be entitled to a paper in itself.

The problem of making wood fireproof or fire resisting is one that has engaged the attention of scientists for some two-and-a-half centuries intermittently, but only within the last few years has it approached solution, and been made the subject of exhaustive and searching experiments upon both sides of the Atlantic.

First of all as to the processes, we find they are various, but the most goneral mode of treatment is somewhat similar to creosoting. The wood is piled on low trollies and run into large iron or steel cylinders or retorts, which, after being closed, are made air tight. The usual vacuum is induced to remove the moisture from the wood, but in some cases steam is first introduced, This prepares the pores of the wood for the reception of the fire-proofing ingredients, which are introduced in the form of a liquid, and forced in by hydraulic pressure of some 200 lbs. to 300 lbs. to the square inch. The wood is by this means thoroughly saturated, the time it remains under pressure varying, of course, with the size and kind of timber, from a few hours to several days. After removal from the cylinder, it is thoroughly dried by artificial heat and is ready for use. The whole process may occupy from twenty-five to forty days.

The solutions used are, naturally, the secrets of the manufacturers, though it is known that ammonia chloride, ammonia phosphate, zinc chloride, or alum and similar salts enter largely into their composition. Another recipe for fireproofing (which I take from the *Building News*) is sulphate of zinc, 55 lbs; potash, 22 lbs.; alum, 44 lbs.; oxide of maganese, 22 lbs.; sulphuric acid, 22 lbs.; water, 54 lbs. The water is heated to 130° Fahr. in a boiler. The solid materials are then added, and as soon as they are dissolved, the acid is gradually introduced. The wood is boiled in the liquid for three hours, then removed and dried.

Generally speaking, it has been found that the result of the treatment is to slightly impair the strength of the wood—say by about 5°/ₒ—but it increases its weight by from 5°/ₒ to 12°/ₒ. It is also claimed that the process preserves the timber, and in no way affects its adaptability for ordinay usage, though, owing to its somewhat increased hardness, tools need sharpening a little oftener when used upon it ; further, it is said to take a better polish on account of the pores being so thoroughly closed up.

Certain woods, of course, lend themselves better to the process than others, notably the open-grained non-resinous woods; whilst those that contain large quantities of pitch and resin, such as pitch pine, and woods that are very oily in their constituents, such as teak, prove to be sometimes more or less refractory to the treatment.

Coming now to the experiments that have been made, we find they are rather contradictory in results, but this may, perhaps, be explained by the difference in the tests.

The two gentlemen who conducted the tests in America did so independently, and made independent reports without consultation, but their conclusions are practically identical, and may be summed up in the words of one of them (Professor Norton), who, in comparing treated with untreated wood, says

"It smokes at about the same temperature."

"It can be ignited at about the same temperature."

"It will continue to burn, *in many cases.*" (The italics are mine).

"It is a good fuel."

"It makes a very hot fire."

These tests, however, from the report before me, appear to have been made upon small specimens of the woods, which were put into fires and the results recorded.

These gentlemen seem also to have discovered that under certain conditions a mould or fungus gathers at the back between the wood and the wall, consequently making it undesirable that any kind of chemically treated wood be placed in direct contact with any part of the steel framing of a building. This disadvantage, it is claimed by a London company, has now been overcome by improvements upon the original American process.

Turning to the English experiments, these were conducted by the British Fire Prevention Committee, and the results are embodied in two remarkable volumes published last year, and entitled "Facts on Fire Prevention." Briefly, these tests were undertaken with a view to ascertain the effects of fire, in a given time, upon partitions or match boarding of "non-flammable" wood, as compared with ordinary wood, in one case the patent wood being also painted with "non-flammable" paint. The comparisons were distinctly favourable to the "non-flammable" wood. A noticeable fact being whilst on one side of a partition the heat was at about 1500° Fahr., on the other it was under 100° Fahr.

Taking the results of the whole we may conclude that a fireproof wood has not yet been invented, but that "non-flammable" wood has certainly been proved to be a fire resistant, and does not assist materially in the spreading of fire.

I have dwelt upon this subject somewhat longer than I intended, but my apology is its great importance and the prominence that has been given to the question recently.

I append a list of the important timber yard fires that have

happened since 1883, and in this connection it may be of interest to state that the Tariff rate for the Citadel Estate, Hull, has been recently considerably increased. The reason for this increase is the number of fires which have occurred, and this unfavourable experience is probably due to the following circumstances among others:—

The timber is all cut timber, chiefly of the thin flooring board class.

The yards are not fenced off from the public.

It was reported that these timber storing grounds were a resort on Saturday afternoons and Sundays for men who ensconsed themselves among the stacks of timber with packs of cards, etc.

In conclusion, I have to tender my best thanks to the following firms for their kindness and courtesy in giving me much valuable information, and for the loan of the blocks to which their names are attached, *i.e.*, Messrs. Armstrong, Addison & Co., of Sunderland and the Tyne, Messrs. The Non-Flammable Wood and Fabrics Co., Ld., of London, and Messrs. The Northern Wood Haskinizing Co., Ld., of Newcastle-on-Tyne.

LIST OF FIRES IN TIMBER YARDS SINCE 1883.

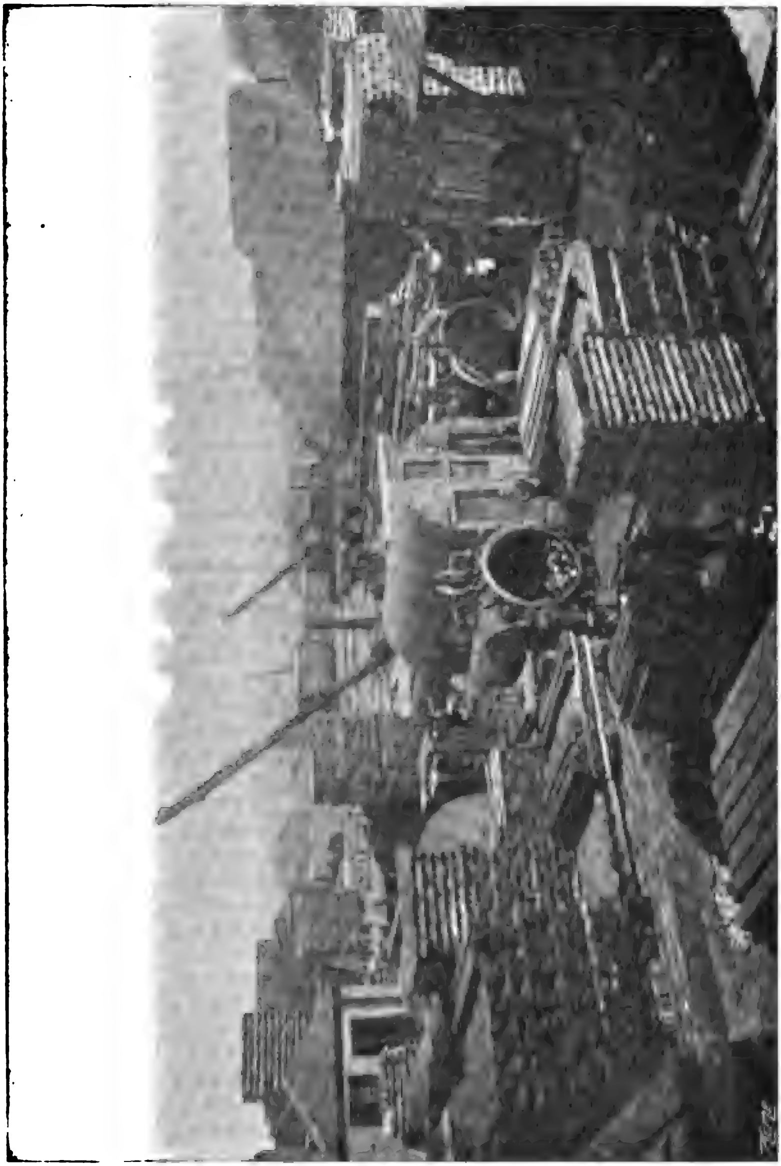
DATE.	NAME, ETC.	AMOUNT.
1884	Flowerdley, Effingham Road, Hull ..	£10,000
1885	Alexander & Co., West Moors, Cardiff ..	10,000
1887	Rowell & Son, Llanelly	10,000
1891	J. J. Norton, West Shore, Poole, Dorset ..	15,000
1892	Williams, Thomas & Co., West Bute Dock, Cardiff	2,500
1892	Citadel Estate, Hull	25,000
1892	T. Rimmer & Son, Canada Dock, Liverpool	3,039
1892	Canada Dock Yards, Liverpool	50,000
1893	Stevenson & Co., Grangemouth	2,000
1894	W. D. Tucker, South Tottenham ..	11,800
1894	S. Westlake & Sons, 51 Tabernacle Street, London	6,582
1895	Love & Stewart, Bo'ness	2,750
1896	Illingworth, Ingham & Co., Leeds ..	10,000
1896	Bryson, Jameson & Co., Citadel Estate, Hull	5,000

DATE.	NAME, ETC.	AMOUNT.
1896	Harvey & Co., Ltd., Truro	2,000
1898	J. Pouler & Son, Cable Street, London ..	3,000
1898	Thomas Dixon, Corporation Street, Belfast	4,900
1899	Garland & Roger, G. & S. W. Railway Co.'s Yard, Dumfries	4.000
1899	Bryson, Jameson & Co., Citadel Estate, Hull	8,000
1899	Roberts & Coope, Brierly Hill, Staffs. ..	10,000
1899	Farnworth & Jardine, Regent Road, Bootle	3,494
1900	T. Shillitoe, Bury St. Edmunds	6,000
1900	Newsome & Co., Victoria Dock, Hull ..	3,237
1900	Lemanton & Sons, Batson's Wharf, Millwall	8,000
1901	Brownlee, Ltd., Craighall Road, Glasgow ..	24,000*
1901	Oliver & Sons, 120 Bunhill Road, London	56,000*
1902	Sanderson Bros., Queen's Dock, Hull ..	2,000
1902	Newsome, Gainsborough	9,180
1902	Langley, Dublin	2,000
1902	Maddock & Tunnley, Manchester ..	6,000

* Saw mill on premises. The amount of loss shewn is that on timber in yard, and does not include loss on saw mill.

J. R. LIDDELL.

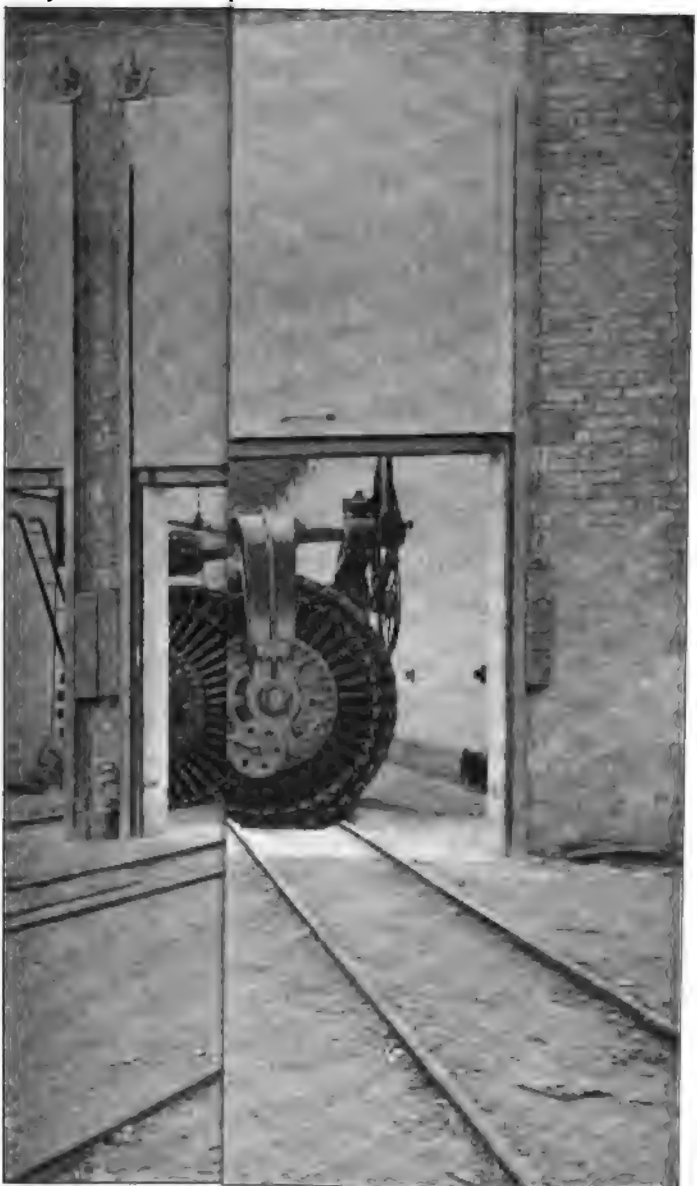
Insurance Institute of Newcastle-on-Tyne,
March 27, 1903.



TIMBER YARD AND CREOSOTING PLANT OF MESSRS. ARMSTRONG, ADDISON, & CO., SUNDERLAND.

MESSRS. ARMSTRONG, ADDISON, & CO.'S TIMBER YARD, HOWDON-ON-TYNE.

G[illegible]s Co., Ld., London.



Newcastle-on-Tyne.

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GEN, NEWCASTLE-ON-TYNE.

PROGRESS OF FIRE PROTECTION.

THE Nineteenth Century stands unique among all the centuries, and instead of a normal growth and development it has been a mighty wave of discovery and invention, profound in thought and beneficial in results. The works of the past, in comparison with achievements of the century just closed, are like the stars of the night in the presence of the noon-day sun. Yet the past contained many of the seeds and plants which, under some marvellous power, have produced the wonderful harvest of to-day.

The experience of the ages at the beginning of the nineteenth century had recorded many discoveries and inventions of great potentiality. The ancients brought to an advanced stage the science of mathematics, the laws relating to many departments of physics were well understood and formulated, architecture both in design and execution had reached a high degree of excellence, and in the fine arts the conception and finish were so marked that we still refer to certain works as those of the great masters, which serve as models for imitation.

Coming closer to the century, the compass was the mariner's guide; the telescope was revealing the depths of space, and printing with moveable type was disseminating knowledge. Oxygen was discovered (Priestly, 1774) and the foundations of chemistry laid. The hem of the garment of electricity had been touched. The steam engine was invented, and its efficiency demonstrated. The nineteenth century began and a new era in the world's history dawned. At that time, however, comparitively little more was being done than had been performed by the civilizations of Babylon, Egypt, Greece, and Rome. The trade and commerce of the world were carried on at no greater speed in the eighteenth century than they were 1000 years B.C. The movements of persons and goods were limited to the speed of pedestrians or beasts of burden on land, and vessels driven by wind on water.

It need scarcely be asked what power came into operation which

in one hundred years has created a new world of conditions. The steam engine was that power, and of all the inventions which the ingenuity of men has worked out it is the most potent, and has more than any other contributed to the material progress of mankind. Though the power of steam was known to the ancients it is not recorded that any useful work was performed by it. The spirit of invention slept for centuries, for no progress in the evolution of the steam engine appears until the seventeenth and eighteenth centuries. There were a few pioneers of James Watt, but to him is due the credit for the most valuable legacy which the nineteenth century received from the past, and was his double-acting steam engine, disclosed in his British patent number 1321, in 1782, which expired 1800, free to the world.

Another invention or discovery may be named which has marked an epoch in the progress of arts and manufactures. About the year 1855 Sir Henry Bessemer patented his process for converting cast-iron into steel, and of all the steps of progress in the art of metal working, none has been so important or far-reaching in effect as the Bessemer process. It is universally acknowledged to have conferred greater benefits upon mankind than any other invention during the past fifty years, and steel by this process has become so cheap that it competes with iron in price, presenting immense advantages in its vastly superior utilities. The past century will be known in history for the perfection of the steam engine, and we are now well started in what may be designated as the "Steel Age."

The potency of these, together with thousands of contemporaneous inventions, will carry the progress of the world to a state of perfection at the close of the present century as much beyond our expectations as was the close of the past century beyond the ken of the pioneers of one hundred years ago. From the thousands of workers in the labyrinths of nature's inexhaustible storehouse there are indications that we are on the threshold of new discoveries which will be steps in advance as marked as any previous inventions have been.

The sun is the great source of heat and power, and may be called the dynamo of the solar system, from which the earth and other planets are receiving immeasurable electrical energy in heat and light. This energy has been stored through the ages of the past in the beds of coal and in other combinations of the elements of nature, and the process is ever going on in the move-

ment of the winds and waves, in the rainfall, and in the yearly growth of vegetation. The ingenuity of man is increasingly being devoted to discover means to utilise this unlimited power, and before the stores of the past are exhausted we have reason to believe that means will have been discovered by which the constant flow of solar energy will be utilised to supply every need of man, even though the population of the earth were increased a thousandfold.

By the law of the conservation of energy, and through mechanical appliances, this power is distributed under what is known as electrical force and transformed into heat and light. If the power of the Niagara River, from lake to lake, can be transformed into electrical energy and distributed effectually, it is estimated it will be equal to a perpetual coal mine, producing 50,000,000 tons and of value 100,000,000 dols. annually. If this is correct of one river, what can be said of all the rivers the waters of which are ever flowing from the inland regions to the level of the sea, and in addition to this is the immeasurable power of the ceaseless tides and winds. The field for inventive genius is unlimited, and from the progress already made we can hope that the problem for the economical generation and distribution of electric energy over wide areas will be solved.

Coming directly to the subject of this paper, it will be found that "The Progress of Fire Protection" is in keeping with progress in general. The fire appliances of modern cities in the steam pumps, mains, hydrants, fire stations, steam fire engines, hose, aerial ladders, chemical engines, electrical alarm systems and brigades of trained men and horses are as much in advance of those of one hundred years ago as are the present mechanical appliances superior to the manual tools of our forefathers. It is not known when the use of fire became known to man, but we may suppose that the knowledge that water extinguishes fire was contemporaneous. In the earliest authentic records of the human race we find man in a comparatively civilised state, living in habitations constructed by his own labour, learned in various arts and manufactures, and carrying on trade and commerce. Fires of more or less frequency and magnitude occurred, destroying his property and thus forcing upon him the necessity of providing means of protection. The primary means was the water supply. In the earliest conditions of communal life, habitations were built near streams or rivers so that water, a daily necessity,

would be at hand. When cities grew beyond the immediate source of supply, distribution became necessary, and the method by which this was accomplished was water-carriers. This method has existed for thousands of years, and is to-day in many Eastern cities the only one adopted. Under this system of distribution the supply was very limited, and to this, more than anything else was due the unsanitary and unhealthy condition of cities in the past and of many of the present time.

During the times of the advanced civilisations of Greece and Rome, and even earlier, works of considerable magnitude were carried to completion for the purpose of bringing water long distances, and in large volume. The Greeks adopted a system of conduits, following the physical formation of the district, cut tunnels and canals, collected water in reservoirs, and distributed it by a ramification of stone pipes to baths and fountains. This system was very costly, the work being principally rock cutting or heavy masonry, and necessarily in the area supplied very limited.

The Romans undertook works on a more elaborate scale, and by a system of tunnels and aqueducts carried water for miles through mountains and over valleys. The two principal aqueducts which supplied the city of Rome in the days of the Emperors were immense works. One was 45 miles long, 35 miles under and 10 miles above ground, and the other 62 miles in length. The water from these two aqueducts was collected in large reservoirs, and thence conducted in underground channels throughout the city. This system, of which there are many notable examples of supplying cities with water, has been in use down to very recent times. Water flowed from its source in the mountains down the gradual incline of the aqueduct to the reservoir without power being employed.

Owing to the imperfect knowledge of the art of metal working, the distribution of water by means of pipes was limited to the use of tubes of stone, burnt clay or lead pipes, unsuited to stand pressure, and in consequence the services of water-carriers for distribution was largely depended upon.

During the eighteenth century the invention and improvement of the manufacture of cast iron completely changed the mode of conducting water into cities. Cast iron pipes can be formed to any dimensions, and easily joined into a continuous main, capable of carrying the pressure arising from the altitude

of the fountain head. This system, either by drawing water from a high reservoir, or pumping directly into the mains at the lowest level, is known in modern times as "The Waterworks" and is in use wherever the progress of the nineteenth century is felt. It has followed as a result of the invention, perfection, and general adoption of the steam engine. It is not necessary to enter into the details of this modern system for the distribution of water, as it is one of the most essential elements of life in towns and cities, with which all are more or less familiar.

The foregoing is briefly the progress of the means of distributing water in cities, and it will be noticed that at the beginning of the last century the conditions were much the same as they were two thousand years before, the supply being mainly from rivers or artificial canals, and the distribution for domestic use and fire-protection by water-carriers, either manual or assisted by beasts of burden, taking it from the source of supply in or out of the city in small quantities, as the demands of the citizens required.

The bucket, a very old domestic utensil for carrying and holding water, is the earliest known fire appliance, and from its general use was ever ready in time of need. It has through all the ages been the most simple and handy means, and at the present time great reliance is placed upon it at the incipiency of a fire. In olden times every citizen was required to keep in his house buckets for fire protection, and to immediately proceed to the scene of the fire, taking with him a bucket. Its usefulness and efficiency were so great that citizens formed themselves into companies, which were known as "Bucket Brigades," and though superseded by modern equipments, the bucket has been the means of extinguishing more fires and saving more property than any other known appliance. Though not forming a principal part of

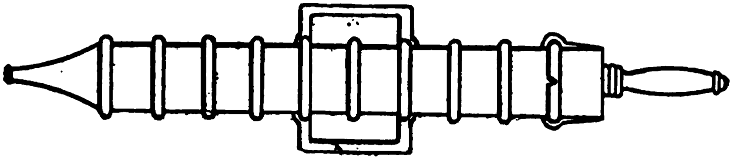

FIG. 1.
Syringe from St. Dionis Backchurch.

Note.—Similar squirts were in use at the time of the Great Fire of London, 1666. Those like the sketch were operated by three men, one at each handle and one at the piston.

a modern equipment, the bucket is the best utensil to dash water on incipient fires, and many fires which assume large proportions would be stayed if this handy appliance were on hand. Its immense value cannot be too strongly emphasised, and it would be a good regulation for every municipality that buckets with sufficient water should be kept in every workshop and other building of designated dimensions solely for fire purposes.

On rebuilding the city of Rome after the great fire of Nero, every citizen was required to keep in his house a machine for extinguishing fires, and as in those days there were "buckets, mops, hooks, and syringes," we may suppose that the latter were the

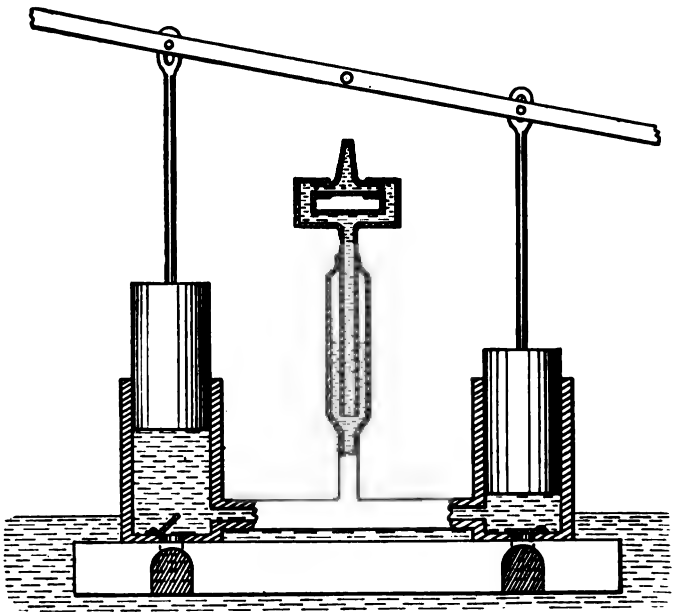

Fig. 2.
Hero's Double Cylinder Fire Engine, 2nd Century B.C.

machines required to be kept. The syringe or squirt, although of ancient origin, long antecedent to the Christian era, does not appear to have come into general use in Europe until late, for it was not until the close of the sixteenth century that hand squirts were introduced into London. Previous to that time, "buckets, hooks, and ladders" only were in use. For some time after the great fire of 1666 the chief apparatus used for extinguishing fires

in London were "leathern buckets and brass squirts." The squirt is described as two feet long, having a capacity of about two quarts of water, and was simply a large syringe.

Though these machines were described by the authorities of the times as valuable auxiliaries for the purpose of extinguishing fires, it must have been noticed how ineffective they were when a fire got beyond its incipient stage.

The manual fire engine, which during the first half of the nineteenth century reached a high degree of perfection, was evidently in its principle, as well as in practice, known to the ancients. The oldest fire engine is described and illustrated by Hero, about 150 B.C., and the description might stand for the ordinary hand engine of the present day. The machine had two single acting pumps, worked by one beam by means of brakes. The streams united in one discharge by passing up a trunk in which was an air chamber, and out at the nozzle, which could be turned in any direction. Curious as it may seem, the use of an air chamber in pumps was considered a recent invention, and credited to Leupold in A.D. 1720.

In addition to the machine described by Hero, Pliny (first century A.D.) speaks of water being forced up by pumps, and maintaining a continuous stream by the pressure of air enclosed. He also refers to the *Sipho*, which, from the description, is understood to be a machine which was used when a fire occurred in the upper part of a house. One of the oldest sketches of a complete set of fire extinguishing apparatus is a cut in a work published in 1546, showing the interior of a laboratory in which, conveniently arranged against a wall, were a syringe, a sledge hammer, two fire hooks, and three leather buckets.

Fire engines seem to have been entirely forgotten in the dark ages, and squirts, or portable syringes, appear to have been the only contrivances in use for throwing water on fires except buckets. The gross superstition and ignorance which held Europe in its grasp not only prevented the establishment of manufactories for better instruments, but actually discouraged their use, and as a consequence there was little or no progress in the useful arts for centuries.

It is not known when the fire engine was re-invented, but during the sixteenth and seventeenth centuries frequent mention is made of them by writers of those times. One of the earliest references is that fire engines were introduced into the city of

Augsburg about the year 1518, and were called "Instruments for Fires," or "Water Syringes." They were described as having wheels and levers, and capable of throwing a considerable quantity of water.

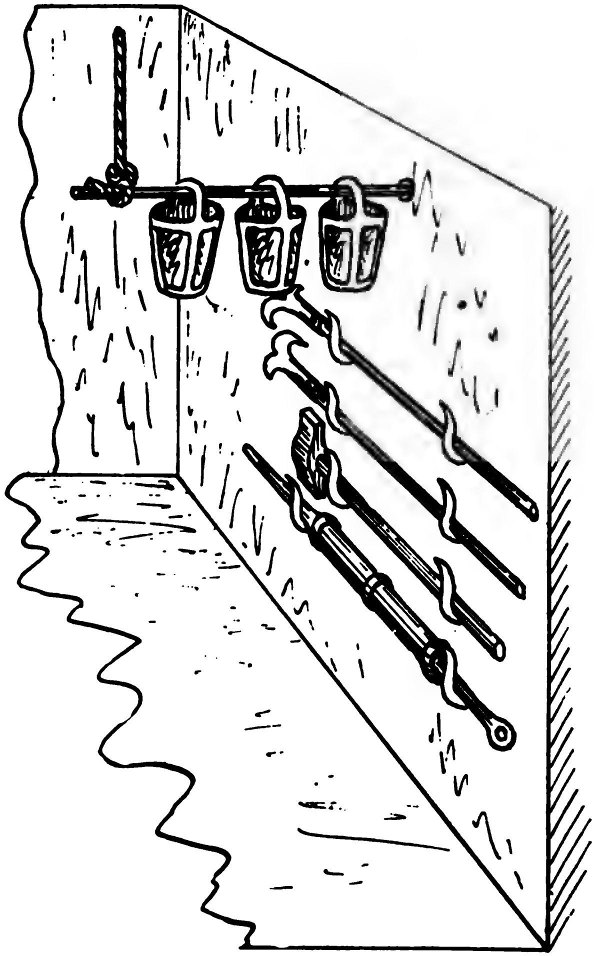

Fig. 3.
Fire Tools, taken from a cut in the old work "De Re Metallica,' of Agricola, published in 1546.

Decaus in 1615 described and illustrated an engine of that period, which he says was much used in Germany. It was said to

cast water 40 feet high by four or five men lifting up and putting down a long handle in the form of a lever where the handle of the pump is fastened. It had no air chamber, and was simply a large squirt.

During the first half of the seventeenth century there was an engine, said to be in general use in Germany, invented or made by John Hautsch, and improved by his son George Hautsch. It was mounted on a sledge drawn about by two horses, and threw a stream of water one inch in diameter to a height of 80 feet when worked by 28 men. Engines of this description were introduced into London in the year 1633, and three of them were used at a fire at London Bridge. It is said of them that "they were such excellent things that nothing that was ever devised could do so

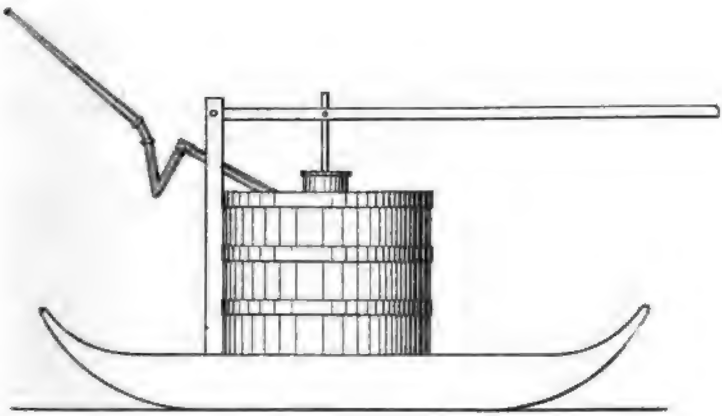

FIG. 4.

German Hand Fire Engine, described by Decaus in his "Forcible Movements," published in 1615.

much good, yet none of these did prosper, for they were all broken." These engines had an air chamber, for it is said "the course of the water which issues by the jet is always maintained in the same state."

Richard Newsham, of London, in 1721-1725 obtained patents for a new water engine for quenching and extinguishing fires. In the specifications and description the inventor claimed among other things that it causes a continuous stream with such force that it empties 110 gallons of water in a minute, and throws it to a greater distance than any other water engine can. The peti-

tioner claims that it may be called a perpetual engine for quenching fires; that it had been played before several great persons, and also before the Directors of the Hand in Hand Insurance Office, who were extremely well satisfied with the performance thereof.

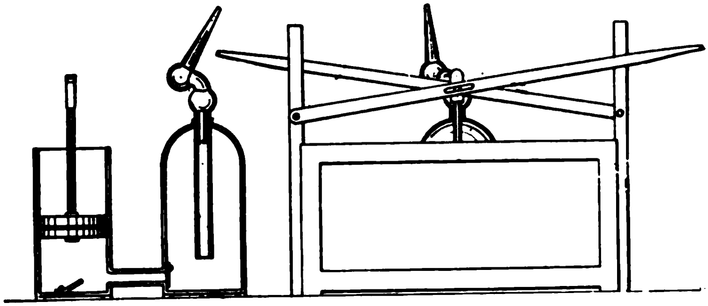

Fig. 5.
German Hand Fire Engine of George Hautsch, used about 1650.

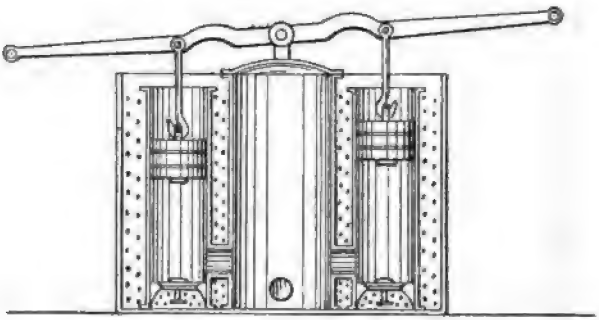

Fig. 6.
Dutch Hand Fire Engine, 1739.

In a book entitled "Universal System of Water and Works," published in 1734, the writer gives extracts from the two circulars of Fowke and Newsham, both rival pump and engine makers, which set forth at great length the merits of their respective engines. Newsham declares that his engine had thrown a stream 165 feet high, in the presence of many thousands of spectators, and appears to have carried off the palm.

A writer in *The London Magazine* for 1752 says of Newsham that "in his engine he gave a nobler present to his country than if he had added provinces to Great Britain. His engines were received with general favour, being purchased by the various

towns in Britain, and also shipped to different parts of the world." The improvements introduced by him converted a crude imperfect machine into one that was really efficient, and from which the modern manual fire engine differs but little. Under great skill and engineering knowledge it developed into a powerful fire fighter, and from its invention in 1721 to 1850, and even later, it has fought many a hard battle with the flames.

There were many other inventors at work on fire engines who brought out improvements, and a style very much used in England in the middle of the eighteenth century was known as "the fore

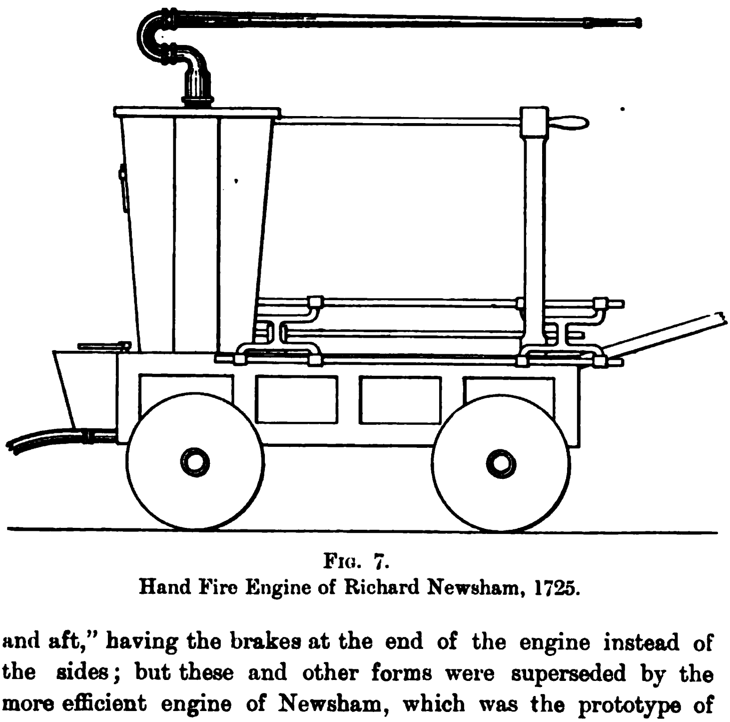

FIG. 7.
Hand Fire Engine of Richard Newsham, 1725.

and aft," having the brakes at the end of the engine instead of the sides; but these and other forms were superseded by the more efficient engine of Newsham, which was the prototype of the modern hand fire engine.

There are still in existence engines made by Newsham in the early period of his work. It is stated that the oldest hand fire engine in the city of Philadelphia, and one of the oldest in America, is a little machine known as the "Sham-Rag" in the possession of Mr. Wm. H. Emhardt, President of the Germantown Mutual Fire Insurance Company. It was built by Newsham

and Rag, of London, England, and brought to Philadelphia prior to 1764.

A description of this machine will be interesting to illustrate an early stage in the development of the hand fire engine:—"The body is a wooden box five feet long, 18 inches deep, and 22 inches wide, lined with copper. The wheels were of solid wood an inch thick. The body or trough rests on axles immovably attached, and hence when turning a corner it was necessary to lift the front wheels from the ground. In the rear are two upright copper cylinders, 14 inches high and 4½-inches in diameter, in which the pistons work alternatively, being raised and lowered

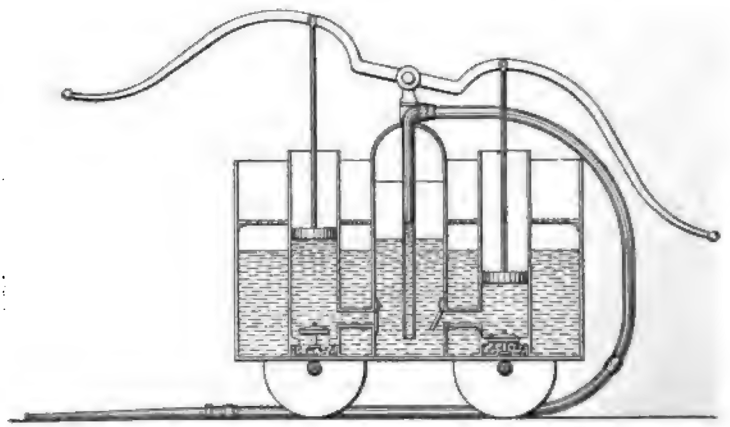

Fig. 8.

Ordinary "Fore and Aft" Manual Fire Engine in use in England in the middle of the eighteenth century.

by two handles six feet long, one on each side, parallel with the engine. Between the smaller cylinders there is a larger one 3½ feet high, and five inches in diameter at the base, increasing to seven inches at the top, out of which comes a pipe called the "Goose-neck," to which is attached a movable joint so arranged that the branch pipe which is five feet long, tapering to a half inch nozzle, can be turned in any direction. There is a suction pipe or hose to be lowered into a well or cistern, but as the engine had to be very close to the burning building it was seldom that water could be obtained in this way, and the supply was dependent upon the passing of buckets of water along the line from hand to hand. Working to its full capacity the engine could throw a stream ½-inch in diameter to a height of 50 feet."

From 1820 to 1850 a great many firms competed with each other in the manufacture of hand fire engines, with the result that the machines grew in strength, in capacity, in ease of handling and beauty of appearance, and are scarcely recognisable as the evolution, except in principle, of the crude engines of 100 years ago.

FIG. 9.

The "Sham-Rag" Hand Fire Engine, built by Newsham & Rag of London, Eng., about 1750.

(From "The American Fireman," February, 1902.

Note.—This engine was purchased by the "Fellowship Fire Company," of Germantown, Pa., about 1764, and during the existence of this company the engine did, what was considered at that time, excellent work. It is still preserved in tolerably good order as a valuable and interesting relic of earlier days. On exhibition occasions when taken out for a little play, it is found that after some handling it squirts probably as well as it did nearly a century and a half ago.

At the Great Exhibition of London, 1851, public competitive trials of manual engines were held, the record of which show splendid results, and it is doubtful if such engines could have been much improved. Among the competitors were Messrs. G. Perry & Bros., of Montreal, who exhibited a manual engine to be worked by 40 men. It was highly commended by the judges for certain favourable features, and was awarded a prize medal. The hand engines made in the United States reached a high state of perfection, and were probably superior in finish to the European make.

During the decade 1850 to 1860, processes were at work for superseding the hand engine by a more effective machine. The steam engine was being rapidly brought into use in all industries, and its advantages for operating pumps were early recognised. Early in the nineteenth century pumps worked by steam were installed for the purpose of pumping water from mines, for drainage, and for fire purposes in large establishments, but they were all of the stationary type.

The application of steam power to work a force pump, arranging the engine, boiler, pumps, etc., on wheels was first carried out in the year 1829 by Mr. John Braithwaite, of London. The engine constructed in that year was of 10 horse-power, with two horizontal cylinders and pumps, each steam piston and that of the pumps being attached to one rod. Its weight was 4½ tons, and it threw 40 tons of water per hour to a height of 90 feet. This engine worked with great success at the fire at Argyle Rooms, Soho, at the burning of the English Opera House, and Messrs. Barclay's brewery, at all of which it greatly assisted in preventing the fire from spreading, and for which gratuitous assistance Mr. Braithwaite received the magnificent testimonial presented to his men of One Sovereign. Although this engine was most successful in its working, and proved its adaptability for the purpose for which it was designed, it met with the opposition which important improvements usually encounter. The principal objections were, it was too heavy for rapid travelling; it would take too long to put it into operation unless steam were constantly kept up; it was too powerful for common use and required larger supplies of water than could be obtained in London streets, and even if water could be obtained the quantity thrown might be injurious and cause mischief.

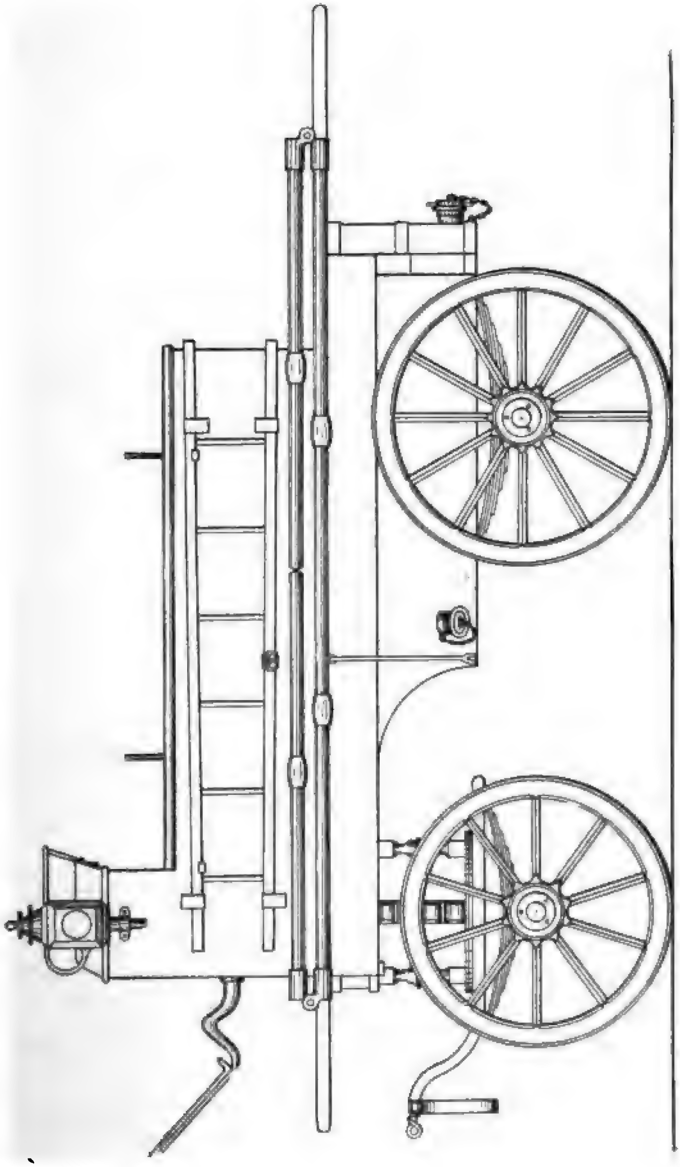

Fig. 10.
Brigade Manual Fire Engine, by Merryweather & Sons, 1865.

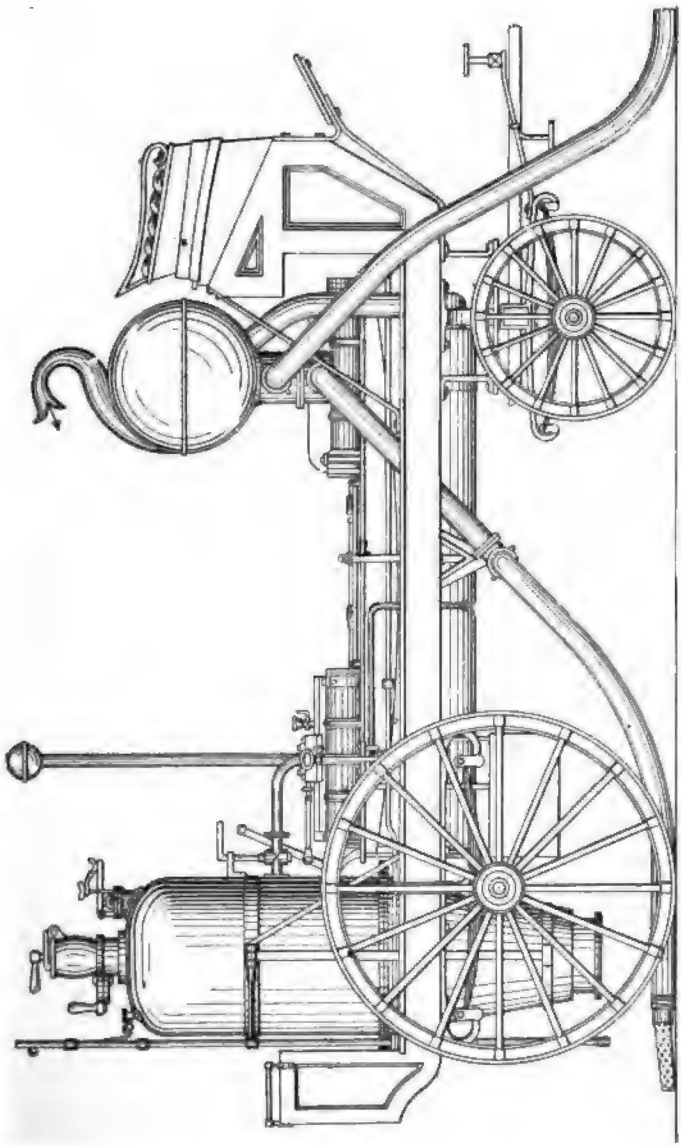

Fig. 11.
The First Steam Fire Engine, Braithwaite & Ericsson, London, 1829.

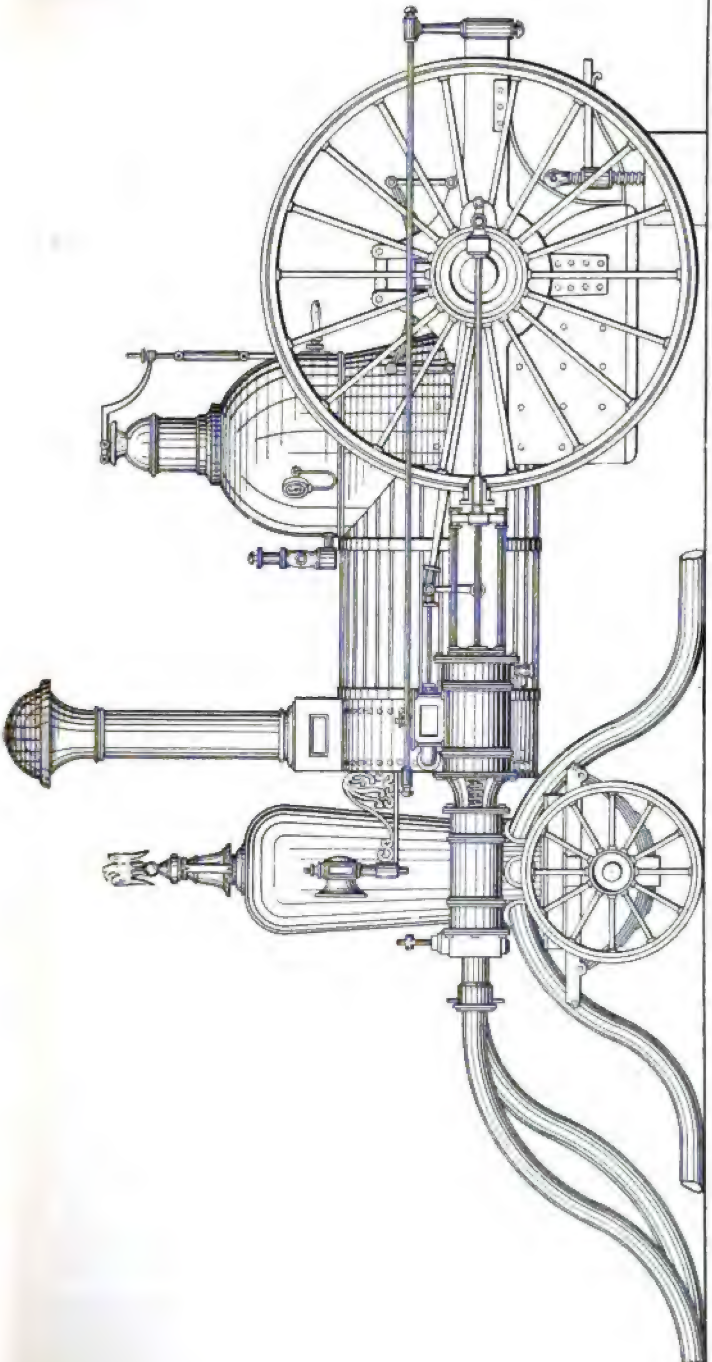

FIG. 12.
The First American Steam Fire Engine. P. R. Hodge, New York, in 1840-1.

The London Fire Engine Establishment, an association of fire companies for fire protection, declined to use or purchase Mr. Braithwaite's engines, and their firemen annoyed him in every possible way when they met him with his engine at fires, so that he ultimately withdrew in disgust. Up to 1833 he built five steam fire engines; one was sent to France, and his fourth, "The Comet," went to Berlin, Prussia, where it was used for the protection of the Government property, giving great satisfaction. There being no demand, he ceased building them, and it must be inferred that the want of steam fire engines had not been felt.

The first steam fire-engine constructed in the United States was designed and built by Mr. Paul R. Hodge in New York, in the year 1840. It was a powerful engine, throwing a 1½-inch stream 166 feet in height, and after a series of trials was purchased by the Insurance Companies and placed in commission at the service of the Fire Department. Apparently he received no great encouragement, for this was the only engine Mr. Hodge built, and it was not until ten years later that any substantial progress was made.

In 1853 Mr. A. B. Latta, of Cincinnati, began the manufacture of steam fire engines which presented features of excellence in advance of any machine previously constructed. These engines, called "steamers," at once secured a great reputation for efficiency and speed in getting to work. An early engine of this pattern on trial made a record as follows:—Steam raised in 5 minutes 15 seconds after the torch was applied, the water in the boiler being quite cold; in one minute afterwards the gauge showed 15 lbs., and in seven minutes 20 seconds after lighting 50 lbs., and in eight minutes from lighting the engine was started, the steam rising quickly to 120 lbs. Using a 1½-inch nozzle, the water was thrown 172 feet horizontally and 125 feet vertically. These results are so nearly up to the records of the best machines constructed later that it may be said the Cincinatti steamers made in the early fifties were types of up-to-date steam fire engines. They established the style of the American fire engine, which is acknowledged to be equal to, if not superior, to any make in the world.

The time during which the steam fire engine reached a high state of perfection is in marked contrast with the years that elapsed in the evolution of the hand engine to anything like an

efficient machine. This was due to the fact that the use of tools and machinery had reached such a stage of perfection by the middle of the nineteenth century that the design of a machine to produce certain results could be executed with a precision that was impossible 100 years before.

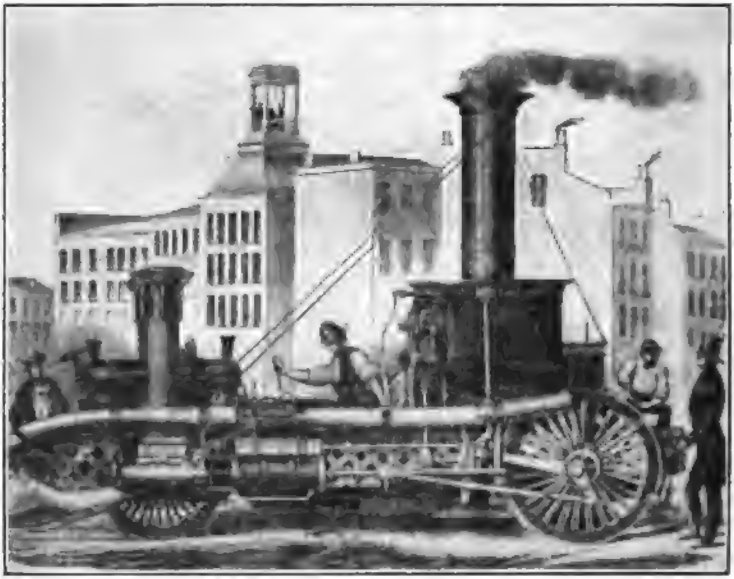

FIG. 13.
"Uncle Joe Ross," the First Steam Fire Engine built at Cincinnati by A. B. Latta, in 1853. (By courtesy of Mr. Clifford Latta, Cincinnati.)

Though the fire engine in its pumps and power to throw water is of primary importance, there is an attachment equally essential, which in combination has made the steam fire engine the most powerful means for combating fire ever produced. This attachment is the flexible line of hose by which the steam can be carried long distances, horizontally or vertically, and delivered in any direction. Before the introduction of flexible delivery hose the engines used at fires were frequently burned, it being necessary to place them close to the fire to be of any use. This was particularly the case at the great London fire, 1666, and also in 1731 at Blandford, when a great part of the town was destroyed, and, in the words of an eye-witness, "the engines were soon burned." In

the early works on mechanics the drawings and descriptions of fire engines show that these ("Gooseneck") were the only kind used in England and France down to 1730.

The invention of leather hose for suction and delivery, which could be formed into a pipe of any desired length, is credited to Jan Van der Heide, of Amsterdam, in the year 1672. He publicly tested it with such successful results that in 1677 the exclusive privilege was granted him for the period of 25 years to manufacture fire engines with leather hose attached. In 1695 the city of Amsterdam had 60 of those engines, and a few years after they were in common use in all the towns in the Netherlands.

Though flexible leather hose strong enough to bear a great pressure had for a considerable time been known on the Continent, it was many years before it came into use in England. The original method of making flexible leather hose by sewing the edges together remained unchanged from 1672 till about the year 1808, at which time Messrs. Sellers & Pennock, of Philadelphia, used copper rivets for this purpose. The riveted leather hose was greatly superior to the sewed seam, and soon came into general use. In 1720 hempen hose was made at Leipsic by Beck, a lace weaver, and at a later date watertight seamless hose was made in England, and though in some respects satisfactory it did not displace leather hose.

Indiarubber hose was first brought out by Mr. Thomas Hancock, of Fulham, in the year 1827. It stood severe tests, establishing its superiority to leather hose. The smoothness of the interior of this hose caused it to be preferred by many makers when trying engines for range and height. Developments in the manufacture of hose gradually reached the perfection of the canvas rubber-lined hose, which is the kind now universally in use, and a superior article for the purpose cannot be well imagined.

Other fire appliances of great value have been introduced of late years, which have added immense power to fire departments and brigades. Among these may be mentioned:—The hose waggon has superseded the hose cart, enabling the firemen to lay a line in the shortest possible time. The modern aerial ladder truck, the largest size weighing six tons, drawn by three horses, carrying ladders from the small 10-foot ladder to the 85-foot extension ladder, is a necessity in large cities. The water-tower, with its

lofty stand pipe delivering a ponderous stream, " siamesed " from the combined force of several engines at the very heart of the fire, sweeping the lofts and floors, is the greatest mechanical aid to firemen in coping with fires in high buildings. The fire boat, now considered an essential in any city having a water front to protect, is a most valuable auxiliary to the land forces. These floating engines are equipped with pumps having a capacity from 4000 to 10,000 gallons per minute, throwing three or four solid streams 400 feet horizontally, and over eight and ten-storey buildings. The "chemical extinguisher," or enlarged to the "chemical engine," mounted on wheels, is now an appliance in many fire departments, and has been found very effective in putting out or checking fires in their incipient stages. The usual type of this engine is a single or double tank waggon, the tanks containing 60 to 80 gallons of chemical solution which consists of bicarbonate of soda and water, with a small cylinder of sulphuric acid suspended in such a manner that it can be mixed with the soda solution in an instant, generating carbonic acid gas and giving the necessary pressure to carry the stream to the fire through hose attached. In well-regulated brigades the " chemical " responds to every call, and it is claimed that a very considerable percentage of fires is put out by this means.

Though abundance of water distributed through a properly constructed system of waterworks, and a complete equipment of the most approved modern fire appliances, handled by a thoroughly trained brigade, are absolutely necessary for fire protection in towns and cities, they fail in efficiency to a large extent without a proper system for giving notice of fires at the moment of their occurrence. The importance of this cannot be too strongly emphasised, and the attention of municipal bodies should be constantly called to the fact that it is bad economy to neglect the quickest method of notifying the fire station of a fire. Most fires can be put out with a pail of water applied at the proper time, and there can be no difference of opinion as to the desirability of getting knowledge of the point of danger at the earliest possible moment. Numerous instances are on record of the importance of this. The Chicago fire is said to have been caused by the upsetting of a lamp in a stable, which could have been easily put out if means for prompt notice to the fire department had been provided or known. The Ottawa-Hull fire is a case in which the brigade tackled the fire as soon as they knew of its existence, and

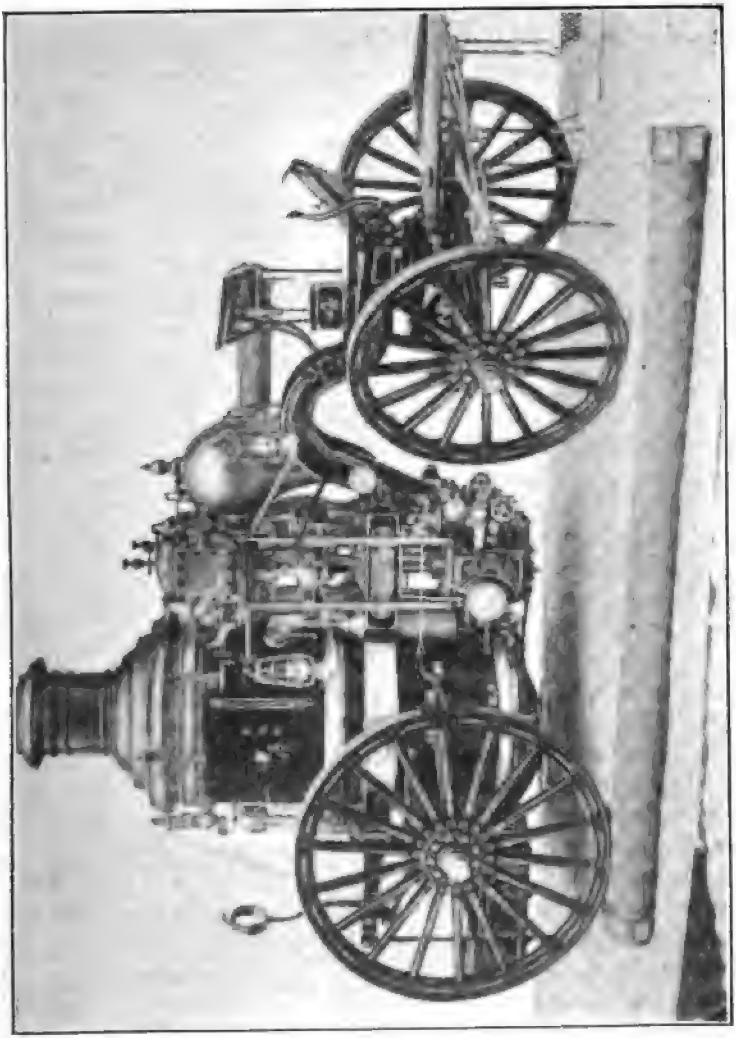

FIG. 14.
The Modern American Steam Fire Engine, 1900.

yet the loss of life and property was appalling; and it is a lesson, that a fire having a good hold before discovery will baffle any combination of men and appliances which may be subsequently brought to bear. The differenco between a fire discovered in time and tackled by two or three firemen, and the same fire attacked by a brigade with full plant ten minutes later, is that of the payment perhaps of a few hundred dollars on the one hand and a possible total loss, with perhaps a conflagration, on the other.

In ancient as well as down to very recent times, the only method of giving the alarm of fire was by anyone who had discovered it calling out on the streets and running to the town or church bell, the ringing of which brought out the inhabitants to the scene with the crude appliances then in use. It was also a custom in larger cities to station watchmen in bell towers, whose duty it was to constantly watch the surroundings and sound an alarm of fire. After the discovery of the means of transmitting messages by electricity, attempts were made to use it by giving alarms of fire. In 1852 Farmer & Channing introduced into Boston the first fire-alarm telegraph. The original system in that city consisted of 19 bell towers, 26 street signal stations and one central station. The alarms were transmitted from the signal boxes to the central station, and then communicated to the bell tower, which would sound the district in which the fire was, calling the firemen to duty. This system was slow and in some respects very uncertain, but was a great step in advance of the former system of bell towers only.

The first automatic signal box, operated by a pull to be freed from the mechanism after the pull is made, was patented by Mr. Charles T. Chester, of New York, in 1867. This was followed by the patent granted to Mr. J. N. Gamewell, of South Carolina, in 1871, on a signal box known as "Distance non-interference," and though many inventors have contributed to the evolution of the fire-alarm telegraph as it is to-day, to him, more than any other, is due the credit for its progress and general use.

Though the present telegraph system presents many advantages, it lacks an element which we would expect in an ideal appliance, inasmuch as someone must have discovered the fire before the alarm is sent into the station. In the principal cities provision has been made to enable brigades to cope with a fire when its existence is known, but little has been done in an automatic sense to facilitate its detection. The majority of fires

break out at night or on holidays, when the chances of detection are slightest, and it is upon the intelligent action of some passer-by that reliance is placed to put the brigade in motion. On the one hand is a brigade ready for action, and on the other a fire smouldering for a considerable time, and a break in the connecting link. When the fire bursts through the roof or out of the windows, and the knowledge of its existence is thus forced upon somebody, the mischief has been largely done, and the loss by fire and water is greater than need have been.

Numerous attempts have been made from time to time to devise some method by which a fire, on its breaking out, shall announce itself, many of which shall be reasonably successful, but no such system has come into general use as a part of the appliances of a city fire department. An ideal appliance must be simple, inexpensive, and automatic, and which must detect a fire in its starting stage and immediately warn the occupants and the brigade of its existence, and must necessarily ramify every building within the area under protection. Such systems are installed in large establishments in connection with automatic sprinkler equipments, and it is reasonable to expect that the automatic alarm will become an essential part of appliances in the fire departments of towns and cities. It is reported that Mr. May, mechanical electrician to the Government of New Zealand, has recently installed (1900) such a device in the city of Dunedin, and that it is giving good satisfaction.

From the very earliest times the frequency of fires forced communities to adopt regulations for the purpose of protecting property and life from the danger arising therefrom, and it was an almost universal regulation that every householder should provide buckets and such other simple appliances, and render all the assistance in his power to extinguish fires. This may be called "Every Citizen a Fireman."

The hand engine, a somewhat complicated machine, required care and attention to have it always in readiness, and also some training in the proper method of handling it, so that persons were appointed for these duties. Out of this grew the "Volunteer Fire Brigade" which flourished down to the year 1870, and is still the system in villages and smaller towns. It would require a volume to relate the enthusiasm displayed by these volunteer brigades, and the deeds of heroism performed in saving life and property. The devotion of the members of these organisations

to duty without reward other than the appreciation of their fellow men, is a bright page in the history of all fire brigades. The names of the best citizens of all cities stand on the rolls of these companies, "running with the machine," "handling the brakes or pipes," and forming the long line of passing buckets, or standing weary hours of watch at the smoking ruins in some city. Not only were noble men killed in the catastrophies which darken the history of fires in those days, for the buildings crumbled away like dust and falling walls were the rule rather than the exception, but a great many died at the brakes of the engine in trying to excel rival companies.

The great and increasing employment of steam fire engines fast reduced the number of hand engines, rendering the formation of large volunteer companies of less importance, one steamer with five or six men being found equal to several hand engines and full complements of men, besides being of greater economy and power. The reorganisation of brigades rapidly took place, and assumed a more military type, the whole department of a city being put under one chief with command of the whole forces, and associated with him lieutenants of divisions and captains of companies. Every man is bound to obey the officer in charge, and discipline in a properly organised brigade is rigidly maintained. The efficiency of a brigade to a very large extent depends upon the commanding and executive abilites of the chief officer in charge, and the time is apparently not far distant when there will be schools of training for the officers of fire brigades on the line of military colleges. This system is called the "Paid Fire Brigade" and is now the only one which is considered efficient in cities and large towns.

A method of private fire protection, known as the "automatic sprinkler system," came into use about 1880, rapidly grew to a state of perfection and is now looked upon as the most efficient means of extinguishing fires ever devised. Though this system has been confined principally to mills and factories, it is gradually being introduced into large mercantile establishments, and results have proved that it is one of the greatest economic inventions of recent years. Though the sprinkler is an English invention, its practical application is decidedly American. The principal feature of this means of protection is an abundant supply of water through a system of pipes and sprinkler heads, distributed so that every part of the building is brought under protection, and the

chief function of automatic sprinklers is to hold a fire on each side by a shower of water. Though it is somewhat expensive to install, maintain, and properly inspect, it has been demonstrated that its compensating advantages are tenfold of the cost.

From the foregoing it will be noticed that the history of fire protection resolves itself into three periods.

1. From the early dawn of history down to the year 1700 A.D., say 20 or 30 centuries, there was no substantial progress, as the appliances at the close of that long period were practically the same as they were at the beginning, and consisted of buckets, squirts, hooks, and a few simple hand used implements kept by each householder, and called into use by the party discovering the fire or by the tolling of the church bell. The water supply was generally deficient, and the distribution dependent upon water-carriers. There were a few exceptions during this long period of almost inappreciable development, which were in the best days of the civilisations of Greece and Rome, in which some feeble efforts were made to provide organised fire protection, but which were lost in the dark ages which followed.

2. From 1700 to 1850, 150 years, is the period of the evolution of the hand engine from a small crude affair to a very efficient machine. Also during this period there was considerable progress in the supply and distribution of water by pipes and storage tanks. Flexible hose, both suction and delivery, was introduced, and Volunteer Fire Brigades generally and efficiently organised.

3. From 1850 to the present time, say 50 years, the most astonishing progress has been made, and may be described as a series of new creations instead of development. This short period has witnessed the general introduction of waterworks, powerful steam pumps, reservoirs, hydrants, steam fire engines, aerial truck ladders, water-towers, fire boats and electrical alarms, with a host of accessories too numerous to classify and describe, backed up by Paid Fire Brigades, on duty day and night, the whole constituting equipments as perfect as the ingenuity of man can well devise.

It may be asked what effect these modern and powerful protective appliances are having in checking and controlling the destruction of property by fire. Though statistics respecting the fire waste are of very recent date, and in many respects incomplete, we are able to determine from the reports of Insurance Departments, with some measure of accuracy, the ratio of the value of property destroyed year by year to the value of the whole

property in the State. As these statistical reports date back only 25 or 30 years, we cannot make a comparison of the ratio of the destruction of property now with what it was 50 or 100 years ago. Though waterworks and the steam fire engine were being introduced about the middle of the last century, they did not come into general use for 10 or 20 years later, so that the full benefits arising from modern appliances have not been felt for more than the past 25 years. It will bc surprising to find that instead of a gradual proportionate reduction in the fire waste it has increased, as shown by the following statistics gathered from Government Insurance Reports covering a period of 22 years down to the year 1901:—

UNITED STATES AND CANADA.

1880-1901,	22	years,	Loss	$58	to	each	$10,000	of property	value.
1880-1889,	10	"	"	55	"	"	"	"	"
1890-1899,	10	"	"	60	"	"	"	"	"
1897-1901,	5	"	"	59	"	"	"	"	"
1897,	1	year,	"	51	"	"	"	"	"
1898,	1	"	"	55	"	"	"	"	"
1899,	1	"	"	64	"	"	"	"	"
1890,	1	"	"	63	"	"	"	"	"
1901,	1	"	"	60	"	"	"	"	"

Notwithstanding the efficient devices which the inventive mind has supplied, and the barriers that have been raised against the danger of fires, the fire loss to the whole value of perishable property has in late years increased, and has reached the enormous sum of about 160,000,000 dols. annually in Canada and the United States.

Viewing the large area over which this property is spread, and its vast value, we must assume that the foregoing figures furnish a fair average, and constitute a reasonable comparison of the proportionate loss of property by fires in recent years with that of previous years, and the conclusion is that in the face of the increased means of protection there are forces at work increasing the danger of fires equal to or slightly in excess of the effectiveness of the appliances provided to control them, and we can only conjecture what the loss would have been if the protection which exists had not been provided.

As everything that has occurred and exists is the result of adequate causes, it may be asked what are the factors which have produced, and are continuing to produce, the frequency of fires, and also cause an increasing proportion to reach a magnitude in excess

of the relative value of the property involved now in comparison with former times. Among the innumerable causes of fires it becomes very difficult to determine the relative importance of many, and even very severe ones may for a time be overlooked. There are processes at work in which from the slowness of development changes are unnoticed, but when a certain stage is reached the susceptibility to fire is suddenly created and the experience of the past disturbed. The most striking feature is the tremendous industrial activity of the nineteenth century, which in magnitude overshadows all previous centuries, and has increased as a tidal wave as the years pass away. Power has been introduced into every conceivable industry, and with the multiplication of machinery displacing manual tools, heat is produced by friction, which has increased the causes of fires a thousandfold. Modern mills and factories, with engines, shafting, pulleys and belts running at high speed, are fire hazards which were absolutely unknown prior to the beginning of last century.

Chemistry, a science which has conferred more benefits upon mankind than any other, has, by analysis and synthesis in the elements of nature, produced an ever-increasing number of new substances, many of which are highly inflammable, and are being increasingly used in the arts and manufactures. A marked example of this was the discovery of petroleum in the United States in 1860, the refining of which brought quickly into use kerosene and volatile oils, gasoline, benzine and naphtha, useful, indeed, but exceedingly hazardous. Fires which have been due to these substances have been legion.

Another and more recent example is the introduction of electricity for light and power, and though apparently the safest method of lighting, it has, from the mysterious and subtle nature of its workings, been found by experience to be dangerous in the extreme when not properly installed, and even under the most approved methods there is always the danger of *short circuits*, *leaks*, and *contacts*, in any of which heat is suddenly generated, and numerous fires are due to these causes. Wires for power and light, many of them carrying currents of enormous voltage, together with telegraph and telephone wires, form a network in the streets of all cities and towns, radiating in all directions into practically every building, under every conceivable condition, and liable under strain or disturbance to cause scores of fires at the same moment. Fortunately, devices are provided which we are told reduce the

danger to a minimum, but in spite of these precautions there are insidious processes at work by which a perfect system in time becomes positively dangerous, and fires will occur notwithstanding the most careful supervision.

Owing to the increasing volume of trade and commerce, premises of larger area are required to carry on the extending operations. Buildings are enlarged by breaking away party walls to adjoining premises. Additions both laterally and in height are made, elevators, stairs and well-holes are put in, making open and free communication to all parts of the building, so that a fire in one part in a few minutes involves the whole, rendering it increasingly difficult for the brigade to handle. From the pressure of competition and the desire for a large business, the departmental store has grown, which owing to the vast amount of merchandise kept and exposed for sale has made this class exceedingly susceptible to fire and to enormous loss.

Within the past few years there has been a growing tendency towards the erection of tall buildings beyond the ability of the fire brigade and appliances, and it frequently occurs that a fire has to be fought in a five or six storey building with appliances effective only to the second or third storey.

The attention of Insurance Companies, architects, contractors, and the public is being called more and more to the necessity for better construction in buildings. Wood for interior work and finish has, for obvious reasons, been most extensively used, and will for a long time hold an important place; but the necessity for non-inflammable materials, especially in high buildings, has forced itself to the front for the safety of life and property. There are many substances in nature that will not in a sense burn, but there are very few suitable for building purposes, and of these few there are still less which will stand unharmed in a moderately fierce fire. A few years ago the skeleton steel frame was considered a fireproof building, but to-day, from sad experience, it is known to be not only a failure, but it is a wonder that so great an amount of engineering skill and money has been wasted in the construction of such buildings. Fire and corrosion are the enemies of steel, and it has been found necessary to cover it with a sufficient coating of fire-resisting materials, and the development in this direction has shown that concrete, steel covered with concrete, and terra cotta constructed buildings stand the best under the severest tests. From indications it would

appear that in the evolution of the fire-proof building there will be more and more concrete, brick and terra cotta used, and less steel, with wood reduced to a minimum. In buildings for factory purposes the aim has not been so much in the direction of fire-proof construction as in that of slow burning—the frame being heavy wood timbers, the walls brick, the floors solid double planking, and the roof light steel trusses covered with non-combustible materials, and without concealed spaces.

Such buildings, no matter what the occupancy may be, when protected by a standard automatic sprinkler equipment, with ample water from two sources of supply, automatic steam pumps and yard hydrants, are considered almost ideally perfect fire hazards, and experience covering a period of twenty years has shown that the fire waste in all classes of factories thus equipped has been reduced from 200 dols. and upwards per 10,000 dols. to 10 or 15 dols. Fire protection is limited by the cost of provision and maintenance, from which we can reasonably determine that it will be many years before all buildings in a city, or even a considerable proportion, will be protected in this manner, or that such protection will become a matter of public charge.

This brief history of the Progress of Fire Protection, which is all that can be attempted within the limits of this paper, indicates the wonderful development that has taken place, and without which the material progress that we see to-day could not have been possible. A study of the subject appears to lead to the conclusion that the splendid public appliances which have been brought into general use have not reduced the relative loss of property by fire, and we must conclude that still further progress will be made to meet the forces that are at work increasing the danger.

As a consequence of the enormous growth in the production and storage of goods, mammoth establishments, both in height and area, have become striking features in all cities, and hazards are rapidly developing which are increasingly difficult for fire protection to keep pace with, and though an accurate forecast cannot be made of future progress, there are indications along the lines which it will probably take. There are limits to the effectiveness of brigades with the best appliances, and when conditions arise beyond these limits, other means must be provided. A fire department has its maximum force at the street level ut as the storeys rise its powers rapidly diminish

and a stage of inefficiency is soon reached. Aerial ladders and water towers are valuable auxiliaries, but they have their limitations and with height increase the danger to life and limb. The public must not expect firemen to attempt the impossible or risk their lives in efforts to save property and life beyond the means provided. It follows, therefore, that if buildings are erected beyond the effective working of a brigade with the best appliances, new and secure standing ground must be provided from which firemen can operate without danger to themselves. This new fighting ground must necessarily be within the buildings themselves and upon which must be stationary and movable appliances with full force of water to reach all parts.

In the congested districts of all cities the tendency is towards tall buildings, and when any considerable number are erected, separate and independent waterworks will have to be installed with mains and pipes of sufficient strength to maintain the pressure of the altitude, with stand pipes, hose connections and other appliances on every flat to enable the brigade to attack a fire in any part in the shortest possible time. The disastrous fires which have repeatedly occurred in tall mercantile buildings, have demonstrated the fact that they cannot be successfully combated from the street level with the most powerful appliances, and so hazardous has the situation become in many cities that separate and independent waterworks systems are being installed or projected for the purpose of specially meeting the serious conditions which have arisen.

Insurance Engineering, a magazine published in New York, has repeatedly pointed out that it is highly desirable that every building of considerable height be provided with interior water equipments whereby, either by fire engine connection at the street level, or with stationary pumps, water for fire fighting purposes may be available, not only for fire within the building itself, but for extinguishment in neighbouring buildings.

What has been said respecting the protection necessary for tall buildings in a measure applies to those having large areas. Modern departmental stores with ground areas from 20,000 to 60,000 square feet, six to eight storeys high, open light wells, stairways and elevators from basement to top, and filled with all kinds of merchandise, constitute fire hazards with which no fire department can successfully cope when a fire has hold, which usually it does during the few moments between the alarm and

the brigade getting to work. So sudden is the spread that in an incredibly short time the stock, and probably the building as well, are doomed, the firemen being congratulated if they have averted a conflagration, which is always more or less imminent. The hazard in such establishments is not so much in greater susceptibility to fire than in medium-sized stores, but in the danger of rapid spread, and in the enormous volume of water required to bring the fire under control. Fires are usually fought from the outside, and the sweep of water among goods over large areas is almost as destructive as the fire itself. Experience has demonstrated that the effective work of the best equipped brigades becomes proportionately less as the area and height increase, and not only is the individual deeply concerned, as his rate for indemnity against loss is correspondingly increased, but the community is strongly impressed with the fact that extra fire hazards have been created for which additional and special means must be provided. The progress of fire protection in respect to tall buildings and large areas will be increasingly in the direction of Public Building Acts and Fire Survey Regulations, making it imperative that the owners of such establishments shall put in and maintain special equipments, not only for the immediate use of the occupants, but as aids to public appliances.

The record of large fires show that the danger of spreading is not so great laterally as it is from front and rear. Properly constructed party walls, which should be municipally insisted upon, usually prevent fires from spreading to adjoining buildings, but from front and rear, owing to necessary openings, the danger is always great, especially from high buildings on narrow streets and lanes. In such situations the firemen are placed at great disadvantage, the heat and flames driving them to positions from which the appliances cannot be brought to bear efficiently. The protection provided is largely by means of fire-proof shutters for the openings, and though of great value, the records of failures from a variety of causes are numerous. Progress is being made in automatic devices for closing shutters at the critical moment, but owing to climatic conditions, and the necessity for frequent inspection, it is not probable that they will be considered permanently reliable.

For outside protection, "wireglass" windows in metal frames have proved very effective, both in laboratory tests and in actual use, and fierce fires have been prevented from spreading to adjoin-

ing buildings by this means. One of the most notable instances on record was the fire in Armour's Packing Establishment, Chicago, 16th May, 1902 (for particulars of which see *Insurance Engineering*, p. 590), which destroyed a considerable portion of the works, but was stayed from spreading to adjoining sections and buildings by wireglass in the openings. Both in the matter of cost, and being always in place, it presents advantages over shutters, which require constant attention in opening and closing, and frequently are not closed, or cannot be closed, at the critical moment. If even a considerable part of what is claimed for wire-glass is reliable, it should be encouraged and extensively used in preventing the spread of fire beyond the building in which it originates.

Another very effective means of preventing the spread of fire is the "Water Curtain," but in its present mode of application it is doubtful if it will come into general use, except possibly in connection with automatic sprinkler equipments. It is within the range of future progress that a water curtain machine, operated somewhat on the principle of a water-tower, may become a part of the appliances of city fire departments. At the risk of appearing ignorant of what has been attempted or in use, the writer would suggest that a truck carrying a standpipe with perforated movable arm pipes attached, to be elevated to the required height, with arms extended horizontally, and supplied with water from a hydrant or steamer, would be an effective water curtain, and would present the advantage of being quickly taken to and operated at the place required. Whether this is practical or not, experience shows that fires can be successfully stayed from lateral spread along the street line by party walls, and it is to be expected that further progress will be made in preventing their spread from openings front and rear. The object to be aimed at, and the one in which the public is more directly interested, owing to the increased cost of maintaining efficient protection, is that a fire shall be, as far as possible, confined to the building in which it takes place, and if a building is large, to a section of it.

The importance of this feature of fire protection is strongly set forth in *Insurance Engineering* for March, 1903. It states—"*The Chronicle Fire Tables* put the total loss in the United States on buildings outside of the ones in which fires originate, during the ten-year period ended with the year 1901, at 402,190,053 dols., or approximately 25 per cent. of the grand total of losses

from fire for the same ten years." In describing the causes which lead to the spread of fires from one building to another, the conclusion arrived at is:—"The reason for this unwarrantedly heavy fire loss by exposure must be found in better construction of buildings, enforced by proper legislation. Every building should be designed to retard fire and confine it in as small an area as permissible, considering the requirements of each case."

The conflagration hazard, that fearful possibility of a sweeping fire beyond control, by which the accumulation of years in wealth of property is swept away in a few hours, exists in every city, and is of such a nature that no protection yet devised has been able to eliminate it. Though possibly it cannot be wholly eliminated, we may conclude that in working out the problem of fire protection, in improved construction, in the increased efficiency of fire appliances, both public and private, in extended use of automatic devices for detection of fires, and in greater ability to quickly concentrate the available force at the required point, the conflagration hazard will be more and more reduced to a minimum. Every appliance devised whereby fires will be stayed at the incipient stage will be a step forward in the progress of fire protection.

Mr. Edwin O. Sachs, an eminent English authority, says:—"*Fire protection is a combination of fire prevention, fire combating, and fire research,*" and "that well protected towns owe their protection in the first place to properly applied preventative legislation based on the practical experience and research of architects, engineers, fire experts and insurance and municipal officials." The subject is one of great economic interest, inasmuch as the destruction of property by fire is a loss to the State, and the matter is one of public concern—the public welfare. Though Insurance Companies have done much to direct public attention to the efficient means of prevention and protection, yet the subject rests principally with the community, and it is in the administration of public affairs, by the adoption and enforcement of legislation which experience has proved necessary, that progress can be hoped for in staying the enormous waste by fire. An erroneous idea, too generally held, is that the loss by fire falls upon the Insurance Companies, whereas the fact is, the burden is borne by the whole community. The premium collected from the owners of property is a tax graded as equitably as varied experience can determine. and distributed by the underwriters to the individuals on whom the calamity has directly fallen. If the tax is heavy it is because the fire waste has been large, and not only must the actual losses

be paid under the contracts of indemnity, but provision should in some measure be made for those which cannot be duly anticipated, the whole operation being balanced over a series of years by the law of average.

A consideration of the causes of fires, though not necessarily coming within the scope of this paper, would show that a very large proportion could be prevented if intelligent means were adopted with this object in view. Much has been well and usefully done by public and private provision for the extinguishment of fires, but while it is excellent to provide efficient means to put out a fire, it is still more excellent to prevent its occurrence when possible, or render it less formidable when in progress. A clear apprehension of the source of danger is precedent to competent measures to avert it. A large proportion of fires is from unsuspected causes, which if known might be avoided, and would be known but for ignorance of what should be familiar. Ignorance and carelessness are responsible for the greater part of the fire loss, and the need is better education as to the conditions which make for safety, and the circumstances which invite danger.

The recognisable causes of fires, such as those due to the use of fire for domestic and industrial purposes, are subject to changes with which all are more or less familiar, and among the variable causes are the increasing magnitude of factories and storehouses, the crowding of goods and occupancies, the invention of new machines, the greater power and rapidity of machinery, the introduction of new processes and new chemical combinations, in most of which the danger of fire is increased in a manner unsuspected and not admitted until experience establishes the fact.

There are causes which have their foundation more in the moral and social status of the community than in the physical conditions of property, and are affected by laws framed for the express purpose of preventing fires, or in the absence of laws for the care of property, or in the adoption of laws which encourage carelessness and wilful destruction for the sake of gain. Information gathered from reliable sources shows the average loss by fire in different countries as follows:—

In France..........	About $	6	to each	$10,000	property value.
In Germany........	,,	10	,,	10,000	,,
In Great Britain....	,,	14	,,	10,000	,,
In the United States.	,,	60	,,	10,000	,,
In Canada	,,	60	,,	10,000	,,

The Commissioner of Insurance for the State of Ohio, in his annual report for the year 1898, referring to the excessive and increasing loss by fire in the United States, says:—

"It seems that the fire loss in this country is unnecessarily large, and that the public is paying, on account of moral hazard, negligence, adverse legislation, want of proper building construction, and the absence of any State provision for investigation of fires, anywhere from 30 per cent. to 40 per cent. more for insurance than they would be required to do if these matters could be considered with the intelligence and seriousness their importance deserves, and properly regulated with appropriate legislation. There undoubtedly exists in our country a situation respecting waste of property by fires that offers a provocation for the exercise of a large amount of wide and practical statesmanship. It may be profitable in this connection to note that in all those countries where insurance cost is smallest there are no valued policy laws, no anti-compact laws, and no anti-coinsurance statutes. Insurance contracts are left entirely to the freedom of the parties making them. Co-insurance, instead of being prohibited, is compulsory in nearly all instances. The making of uniform rates is encouraged as a matter of protection and fair treatment to both the Assured and the Companies, and instead of valued policy laws, public opinion and the courts strenuously hold to the principle that Insurance contracts are for indemnity only, and under no circumstances shall lead to profit. In France the owner of or tenant occupying a building in which a fire originates must show to the court that the fire did not originate on account of a defect in the building or from carelessness or design before he is entitled to any insurance, and then only to the actual loss or damage sustained at the time of the fire, if fully covered by the terms of the policy, and if he cannot do this his insurance is forfeited, and, besides, he is held responsible for all damages that happen to others on account of the fire."

The laws in Germany relating to the construction of buildings and the care of property are somewhat similar to those in France, and while in Great Britain they are less restrictive, in all these countries there are no laws relating to Insurance which would encourage the destruction of property for the object of gain. The Commissioner for Ohio, in the same report, publishes Tables showing the fire loss in that State for three consecutive periods, with results as follows:—

1870 to 1879,	10 years,	loss $58	for each	$10,000	property insured.
1880 to 1889,	10 years,	„ 66	„	10,000	„
1890 to 1898,	9 years,	„ 68	„	10,000	„

He says:—"This increase of ratio of fire loss in Ohio since the passage of the valued policy law in 1879 is very significant in view of the fact of our improved buildings and our improved fire protection in all the cities, towns, and villages of the State. All the conditions in other respects remaining the same, the fire loss proportionate to the amount written, or premiums collected, ought to be 10 per cent. or 15 per cent. less since 1880 than it was before, while the contrary, however, is the result. I have no hesitancy in believing that over-insurance, sanctioned and encouraged by the valued policy law, is the cause of the greater portion of this increased fire waste, and that this unnecessary waste will continue and grow worse as long as this statute remains a part of our Insurance code."

Though the fire waste is no doubt increased, as Insurance commissioners and others have pointed out, by the enactment of laws in violation of the essence and spirit of Common Law, which over and over again lays down the principle that "INSURANCE IS INDEMNITY ONLY," yet the causes of fires are most largely in the conditions of property itself, under the ceaseless activities and necessities of human life. And while the destruction by fire in the United States and Canada is relatively greatly in excess of what it is in the European countries named, it is due to conditions clearly recognisable. In the one case the conditions are in a state of comparative equilibrium, the result of development during centuries, crystalising experience into custom and law. In olden times the dread of fire, with its fearful consequences, and with no means of combating it except the crudest hand machines, forced communities to adopt regulations of the most stringent nature to prevent the occurrence of fires, and which in a marked degree made up for the weakness of the primitive appliances. Whereas, on this continent is witnessed a transformation from a state of nature in one, two, or three generations to hives of industrial activity during which cause and effect have not been clearly defined or formulated into laws. Time will gradually bring improvement; experience will determine the causes of fires and necessity will provide the remedy in the adoption and enforcement of Building Acts, Fire Survey Regulations, and laws for investigating the origin of fires, under the operation of which the destruction of property will be reduced.

The conclusions that I have arrived at in the preparation of this paper, which has necessitated a considerable amount of reading and research, are :—

1. That notwithstanding the splendid fire appliances which have been provided, and are being publicly maintained at great cost, the destruction of property by fire has, relatively to the whole value of property in the State, increased and is proportionately greater now than it was before their introduction.

2. That this is due chiefly to the enormous industrial activity of the nineteenth century, which has increased in geometrical ratio as the decades have come and gone, and during which machinery driven by power has superseded manual tools in the production of all kinds of goods, and that in order to keep pace with this enormous production of merchandise, trade and commerce have expanded, causing crowding and congesting in existing storehouses, and necessitating the erection of larger ones, which under pressure has been done without due regard for safety, in all of which the hazards of fire have been increased proportionately greater than the efficiency of the appliances for protection.

3. That the fire waste which has been increasing will in all probability continue to increase for some time to come, inasmuch as the progress of industrial activity has by no means reached a stage of equilibrium, and the changes which must of necessity take place to meet the expansion will be in the direction of enlargement of buildings and overcrowding of goods and occupancies, creating conditions in which the susceptibility to fire and heavy loss will be relatively increased.

4. That in view of the enormous fire loss, approximating 160,000,000 dols. annually in the United States and Canada, and the fact that it has been relatively increasing in the face of powerful protective appliances, the necessity becomes more and more imperative for the adoption of preventative measures in Building Laws, Fire Survey Regulations, and investigation of the causes of fires, and specially that persons shall not be permitted to erect buildings of area and height in which fires would of necessity be beyond the ability of a well equipped brigade to handle, unless in such buildings are installed protective appliances equal or superior to public fire protection. Also changes in existing buildings should not be permitted where the fire hazards are unduly increased. Much, of course, in the progress of industrial life must be left to the individual, and while the increasing cost of insurance for

unsafe conditions will tend to improvement, it is better still that the experience of the many shall be formulated into codes of regulations and laws and enforced for the benefit of the whole.

It is, therefore, in the adoption of intelligent means of prevention that success in reducing the fire waste can be hoped for; and in conclusion I would call special attention to the following quotations from *Insurance Engineering* for March, 1903:—

Notes on Construction.

The loss by fire can be reduced if buildings are constructed according to underwiters' standards. The safety of a building and the rate of insurance are affected favourably by the following named features:—Large areas avoided by properly constructed division walls and cut-offs; fireproof walls; fire-resisting windows and doors of approved construction; metal ceilings; roofs of fireproof construction; side walls constructed of or sheathed with fire-retardant materials; all vertical openings (elevator or dumbwaiter shafts, stairways, etc.) constructed and protected according to underwriters' rules; use of whitewash or fire-retardant paints instead of inflammable varnish or oils; stairways inclosed with fireproof materials; hoistways, etc., provided with automatic fire doors; metal posts and girders insulated against severe heat; partitions made fire-resistant by the use of expanded metal, wire lath, asbestos board, plaster board, etc.; skylights of wireglass or prism glass in metal frames; properly built flues; fireproofed wood trim, etc.

Notes on Spread of Fires.

One-third, or about 50,000,000 dols., of the annual fire waste of the United States is due to exposure losses; that is, the spread of fire from one building to another, or from floor to floor, in buildings of general occupancy. The so-called "conflagration hazard" in Fire Insurance depends upon the degree of "exposure" danger. This danger can best be prevented by proper construction; a sufficient number of fire walls; by making walls, roofs, and floors free from concealed spaces; doors, windows, and skylights protected by fire doors or shutters, or wireglass or prisms set in metal frames; roofs of fireproof construction; outside sprinklers on roof and over windows; inclosure of stairways with fireproof materials; protection in a similar way and with automatic fire doors at all vertical openings; fireproof or fire-retardant floor, partitions, and ceilings, etc. Various types of construction and materials have been shown by underwriters' tests to possess value in pre-

venting the spread of fires. In addition, the most complete equipment of the premises with fire-extinguishing facilities is desirable. Instances are on record in large cities where conflagrations, when beyond the control of the fire department, have been checked by fire walls which have operated as barriers, or by effective fire streams brought into play from buildings where heavy pumping machinery was installed.

Notes on Lighting, Heating, and Ventilating Systems.

The proper installation of all heating apparatus is important. Woodwork should be protected from the hot steam pipes; ceilings over boilers or hot air furnaces should be of metal or sheathed with some non-conductor; spark arresters are recommended; lint and dust accumulations should be avoided; blower systems, whether for ventilating or heating, are safest when cut-offs are provided in the pipes. Construction of flues is of prime importance. Proper storage of fuel and the keeping of ashes, waste, and other *débris* in metal receptacles reduces fire dangers. Methods of installing all manner of electric apparatus are prescribed by underwriters' codes. Distinct fire hazards may attach to insulated wire, switches, fuses, transformers, dynamos, motors, rheostats, heaters, cut-offs, sockets, conduits, etc., and the underwriters' rules and approval of these devices should be followed. Gas lighting presents dangers which underwriters point out. Lighting by gasoline or acetylene should never be attempted except by full compliance with underwriters declarations as to approved apparatus, rules of installation, and storage of gasoline or carbide, as the case may be. Heating and cooking with oil or gasoline stoves present many dangers and come in the same category.

Notes on Fire Protection of Premises.

Automatic sprinklers (especially with alarm valves), approved chemical extinguishers (portable or stationary), fire pails, pumping machinery, properly constructed standpipes with hose attached on every floor, and employees trained to handle fire outbreaks, are of the utmost value, especially in large mills, factories, and mercantile establishments. A fertile source of fire outbreaks is removed if oily waste and other inflammable *débris* are kept in metal receptacles and emptied once a day or oftener. Smoking should be prohibited. Machinery should be kept lubricated and in alignment. Hose is often useless unless properly taken care of, and is always useless after a few months unless of the best quality, which means frequent tests and proper coiling.

Notes on Fire Alarms. The loss of a few minutes in sending in an alarm of fire may cause thousands of dollars of added loss. Interior fire alarms of approved patterns cause favourable allowances in Fire Insurance premiums. Auxiliary boxes, by which fire alarms can be sent in by hand, or automatic systems which operate on thermostatic principles, save valuable time. Competent watchmen, whose vigilance is assured by the installation of watchmen's clocks, are an added security.

Every Fire has its Lessons. The value of superior construction, the need for the maintenance thereof, the importance of keeping the premises free from inflammable accumulations, the advantage of quick fire alarms, the necessity for proper fire-extinguishing facilities, etc. These lessons should be pointed out, over and over again, in the interest of public safety. Only by reiteration and agitation can progress be made toward the elimination of dangers.

By offering reduced premium rates on well-constructed and properly protected property, underwriters encourage scientific building and efficient fire-extinguishing methods; by laboratory tests and through boards of expert engineers they investigate apparatus, materials, and processes, thus determining their comparative safety or comparative danger. Architects, engineers, building departments of cities, municipal fire departments, public-spirited citizens and manufacturers of useful materials and devices are labouring toward the same end.

Among the sources from which I have gathered information for this paper, I would mention the following:—

"Fires, Fire Engines, and Fire Brigades," Chas. F. T. Young, C.E., London, 1866.

"Pearson's Magazine," "Modern Fire Protection."

"Insurance Engineering Magazine," published in New York.

Paper on "May's Automatic Alarm," by G. H. Otway, read before the Manchester Institute, December, 1900.

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Toronto Insurance Institute,
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TUBERCULAR DISEASE AND HEREDITY IN RELATION TO LIFE ASSURANCE.

THE first point is to understand what is meant by "Heredity." Various views may be taken as to what is connoted by this word, but from the Insurance point of view we must hold it as including all the tendencies and peculiarities which the proposer inherits, through his parents, from his ancestors. It is well known that a person may inherit such although neither of his parents is or was so affected. One of the most notable illustrations occurs in connection with a disease which is, happily, rare, but is of such a striking nature as to be well known when it does occur: "Hæmophilia" or "The Hæmorrhagic Diathesis." With this constitution, the patient is liable to excessive bleedings from even trivial wounds, or extensive bleedings internally, or into the joints, from trifling bruises. Such persons are popularly spoken of as "Bleeders."

Now in this disease we may say that males only are affected, and yet the inheritance is from the mother's side. Hence, the parents are never affected: the fathers do not transmit it, and the mothers are not liable to it in virtue of their sex.

This occurrence of bleeders in three generations is shown in Table I.

TRANSMISSION TO MALES IN FEMALE LINE.

Family History, showing the occurrence of the Hæmorrhagic Diathesis in three successive generations. Transmission in the female line of descent, but only males affected.

1ST GENERATION.

A *maternal* grand-uncle (the brother of maternal grandmother) was a BLEEDER: he died æt. 30: was married, but had no family.

2ND GENERATION.

A *maternal* uncle was a BLEEDER: he died æt. 26: he had one male child, but he was not affected.

This man had numerous cousins, and two out of his three *maternal aunts* had BLEEDERS in their families—THREE IN ALL. No Bleeders in the families of his five maternal uncles.

3RD GENERATION.

The patient, a boy æt. 8, and his brother, who died æt. 6: BOTH BLEEDERS. Other two brothers and three sisters not affected.

TWO male cousins BLEEDERS, the children of a *maternal aunt*: one female child in the same family not affected. In another large family of cousins, males and females, by another maternal aunt, none affected.

Some other diseases, *e.g.* Pseudo-Hypertrophic Muscular Paralysis, have similar features, as to the occurrence chiefly in the male sex, with inheritance from the female side of the house. Such instances show that we must go beyond the parents in studying hereditary tendencies.

Occasionally, it would seem as if liability to certain diseases, and other family peculiarities, may pass over a whole generation, or more than one, and yet appear in the next. This interesting phenomenon is spoken of as "Atavism." In Table II., here given, I traced a family tendency to tubercular disease in the grandparents and grand-uncles, although no such diseases were known in the parents or the uncles and aunts of the patient.

ATAVISM—TRANSMISSION OF PHTHISICAL DISEASE.

Family History of a young man, showing a marked tendency to Consumption, derived apparently from the Grandparents, without involving the intermediate generation.

1st Generation.

Paternal Grandfather, ...	died of "Decline in bowels,"	æt.	62.
——— Granduncle, ...	——— "Consumption,"	,,	30.
——— Granduncle, ...	——— "Consumption,"	,,	50.
——— Grandmother, ...	——— "Liver Complaint and Decline."		

2nd Generation.

Father: always healthy, ...	killed by accident,	æt.	62.
Paternal Uncle: healthy, ...	——— accident,	,,	18.
——— Uncle, ...	living and well,	,,	66.
——— Aunt, ...	died, three weeks ill, "sore leg,"	,,	50.
[Mother of patient: no Consumption traceable in her family, ...	living and very healthy,	,,	72.]

3rd Generation.

Patient and four of his Sisters all died of Pulmonary Phthisis, ages from 23 to 45 years. A Brother died of a "rack or strain," followed by purging and vomiting, æt. 23.

Six other Brothers and Sisters living and well, ages from 27 to 52 years. Of these several have families: one Cousin of the patient's died of Consumption, æt. 20, in one family; in another, two Cousins died of "water in the head," and one died of "overgrowth with swelling of the belly."

In Table III. we see a healthy mother transmitting a tendency to consumption, and there is the further interesting peculiarity of two separate diseases being transmitted to the children from the two parents—the father presumably transmitting rheumatism and

heart disease, the mother transmitting consumption. In this case, I was fortunate in getting very precise information from the patient, who was herself a nurse, acquainted with the diseases in question.

TRANSMISSION OF TWO FORMS OF DISEASE.

Family History of a Young Lady, æt. 25 years, affected with a second attack of Acute Rheumatism, complicated with Pericarditis and Aortic valvular disease: distortion of the joints supervened.

FATHER.	MOTHER.
Has had rheumatic fever; his Brother has "Rheumatic Gout."	Healthy; but two of her Sisters and one of her Brothers died of Consumption.

FAMILY.

Eldest Brother: two attacks of rheumatic fever, with pericarditis both times: died of affection of heart and lungs. Another Brother: slight rheumatism in knees, but no heart affection. Eldest Sister: pains in knees and shoulders, but no serious illness.

Other five Brothers and Sisters: none of them rheumatic, but some of them affected or threatened, more or less distinctly, with consumption.

The investigation as to Heredity thus embraces parents; grandparents and their brothers and sisters; uncles and aunts; brothers and sisters. The case of half brothers and sisters requires careful discrimination; and still more care is required if cousins are taken into account, as other families come in to influence the offspring; but by careful inquiry and analysis they can be made sometimes to aid the investigation, as in Table I., showing the occurrence of "Bleeders."

Information regarding all these relatives, as to their ages, the causes of their death, or the occurrence of disease in them, is not often obtainable. I have noticed, for example, that comparatively few proposers can give the ages attained by *all* their grandparents or the diseases of which they may have died, although they often start, confidently, to do so. Very often one is omitted; and that one usually is the most important for Insurance purposes; because it is when a grandparent dies young that the proposer is least able to tell anything as to the age or the disease in question.

The information regarding family history sometimes takes a deceptive form, and the age of the proposer has to be considered in estimating its value. A young man of 21, perhaps, the oldest of the family, may present a pretty good family history simply because sufficient time has not elapsed for the development of family tendencies in his brothers and sisters, or possibly even in his parents themselves.

Or, take an example from the other extreme of age. An old lady, well known in Glasgow to have come of a family in which tubercular disease had appeared again and again, lived to old age, with every appearance of health. Two of her own children were supposed to have died of tubercular disease, after they had attained mature years. If it had been argued that they had inherited their tendency to this disease from their mother, her own good health and activity, through a long life, might have been adduced in opposition; but when nearing 80 years, she herself developed tubercular disease of the bones, in various regions, requiring, ultimately, amputation of the foot; after recovering from this, she became affected with tubercular pyelitis; her death was due to acute bronchitis, and I doubt if any tubercular indications appeared in her death certificate.

The second preliminary for us to consider now is what is comprehended in the term "Tuberculosis." This includes not only consumption of the lungs but many other diseases besides. Most cases of pleurisy in young subjects; many of the cases of pneumonia which follow a lingering course; consumption of the bowels, tabes mesenterica, tubercular peritonitis or inflammation of the bowels; water in the head or tubercular meningitis; diseased bones and joints, for example spinal disease and hip-joint disease and white swelling in the knee; scrofulous glands in the neck and elsewhere; renal phthisis or tubercular pyelitis; and many other less commonly known forms of disease. In addition, however, there is a vaguer group such as deaths from "over-growth" and "over-study"; "change of life" in young girls and middle-aged women is often a mere euphemism for phthisis; "childbirth," as a cause of death, is well recognised as often really of this nature.

Many of these diseases may exist in certain members of the family without causing death, but their existence is equally important, even in slight forms, as evidence of family tendency to tubercular disease: equally so, of course, if the members of a family recover from the graver forms.

The prevalence of pulmonary tuberculosis may be inferred from a statement published by the late Professor Coats, of this city, that in *post-mortem* examinations on cases which have died from non-tuberculous disease 20 per cent. showed indications of *recovery* from this grave disease.* Proposers for insurance, even

* Joseph Coats: *Manual of Pathology*, 4th ed., Lond., 1900, p. 792.

if they knew of it, would seldom think of telling of *recoveries* from lung disease amongst their relatives.

From all this, we may gather how imperfect our record of family tuberculosis must inevitably be, even when the facts are carefully and skilfully searched for, from people of ordinary intelligence and honesty of statement. If we add to these causes of defective data want of intelligence and knowledge, and more or less deliberate or even unintentional concealment, the difficulties in getting fair statistical data as to the prevalence of tubercular disease in a proposer's family are seen to be enormous.

We must always remember that when a proposer dies of consumption, say 5 or 10 years after insurance, the papers do not show the facts of the family history, as to disease and death, at the date of the claim, but merely at the date of the proposal: this point will be referred to later.

Perhaps someone may say, "Why talk of heredity and family "history as regards consumption? Since the discovery and "acceptance of the *rôle* of the tubercle bacillus in 1882, is it not "infection, instead of heredity, which we have to consider?" Insurance agents eager for business, equally with proposers themselves, take up this argument when unfavourable family histories obtrude themselves.

As an instance I may quote a recent case where a man 34 years old, in proposing for life insurance, had to admit that his three sisters died of consumption at 36, 30, and 25 respectively. But, of course, as usual, "it was not in the family"! The one who died at 30 had married a consumptive subject who had been rejected for life insurance because of his lungs; but he managed to survive his wife, whom he was supposed to have infected; and then he married his deceased wife's sister, who also died of the disease. The third sister had attended these cases of illness, and she also died of tubercular infection, as alleged, derived originally from her brother-in-law. The proposer thus maintained that, notwithstanding the death of his three sisters, the disease was not hereditary, but due to extraneous infection. In the proposer's statement, however, we find that a brother of his own was put down as having died at the age of 40 from "Abscess." Such a cause of death in a man (without further explanation) must be regarded, almost certainly, as due to tubercular disease of some kind, probably of the bones. Whether the victim of the "Abscess," like his three unfortunate sisters, had been infected through marriage, does not appear!

Some people compare tuberculosis with typhoid fever and say, "As well speak of typhoid fever being inherited as this "infectious disease of tubercle." Well, take typhoid fever: what of the Royal Family? The King nearly died of it some 30 years ago; his father died of it; and his son, the present Prince of Wales, had it also. Does family tendency count for nothing because the disease is infectious and due to a microbe? It has long been recognised that even in acute infectious diseases there may be a family liability to contract such diseases, or when infected to have them in a bad form.

This view of the non-hereditary nature of consumption is not a new idea based on the discovery of the bacillus. In a discussion in this city on phthisis, in 1881, Dr. J. D. Hamilton, now Professor of Pathology in Aberdeen, contended that it was not hereditary. He said, "Tubercular mothers do not give birth to tubercular children." He admitted, however, the transmission of a "pecularly sensitive character of the pulmonary epithelium." Whatever may be said for this distinction from the point of view of theoretical pathology, certainly from the point of view of Life Assurance the distinction is vain. If a peculiar liability is transmitted, that is enough. At the discussion referred to I protested against this verbal distinction in the name of practical medicine, and I do so now on behalf of Life Assurance.*

A scientific statement may be quite accurate and precise, but just because of its precision it may be misleading when rashly applied in practical life.

To say that tubercle is always due to an infection from without, and never to heredity, might perhaps be true (although the proposition, which I will subsequently dispute, is not put in this extreme form by anyone of authority), and yet it would be very misleading, in its practical applications, if, as all admit, a certain constitution may be inherited which favours the reception and growth of the tubercle bacillus. It is the old story of "the Seed and the Soil." †

* *Glasgow Medical Journal*, April 1881.

† See an interesting Lecture by Dr. W. H. Dickinson, "The Seed and the Soil" (on the text of the Parable of the Sower), *Lancet*, May 10th, 1902, p. 1297. "In grasping the new pathology of microbes and bacilli let us not quite ignore the ascertained facts of old time with regard to heredity, tissue and diathesis."—"Increased susceptibility is the determining factor in many diseases at the head of which class we may confidently place the family of tuberculoses."—"If I have taken up your time with old commonplaces it is because old truths are apt to be pushed aside and forgotten in the attractions of modern science with its rapid movement and ever-changing phases."

In one of his striking and illuminating contributions Lord Lister discussed the souring of milk. He showed, as a matter of science, that milk has no inherent tendency to sour.* The souring was caused by the action of a microbe, which produced this remarkable change. This germ was abundantly present in byres and dairies, although scarce elsewhere. In the absence of this special infection (if we choose for the moment to call it so), milk does not sour: it may change and putrefy and become mouldy, but it does not sour. While recognising the importance and truth of Lord Lister's discovery and dictum, we all know that milk, as practically handled, *has* a tendency to sour, and we take measures accordingly. As a matter of science, milk *per se* has no tendency to sour: as a matter of fact, getting it in the ordinary way from the cow, milk does sour. We don't dispute the importance of the "Bacterium Lactis," but as practical men we recognise the facts.

I sometimes give a homely illustration to my students in the hospital wards. I say to them—"You are probably taught in certain class-rooms that consumption is not inherited, and you may wonder at me talking of family history, in the case of our patients, as if this were important. You perhaps regard my views as too antiquated, in the light of bacteriological inquiry. Now, I fully accept the capital importance of Koch's discovery of the bacillus as the cause of tubercle. But it is possible that both sides may be essentially right. If a youth attending some popular science classes in Glasgow goes home to the country, he may hear his grandmother speaking of the mould on a pair of old boots, lying in a room, as being a proof of damp; her grandson, full of pity for her antiquated notions, explains that mould is a vegetable growth, due to a living germ, which has infected, as it were, the boots, and made them mouldy; he may offer to demonstrate the growth under the microscope, and ask triumphantly if 'damp' can cause a vegetable growth. And yet the grandmother is just as near the

* Lister: *Transactions of the Pathological Society of London*, vol. 29, London, 1878. "We see, therefore, from the facts which I have adduced, that the souring of milk, instead of being—as might naturally be supposed *a priori* from seeing it occur constantly in all milk brought from a dairy—an inherent property of the liquid, is a change which, whether in milk boiled or unboiled, requires the introduction of something from without, and that something a scarce article both in the air and in water, except in dairies," p. 443.

"In dairies it [the microbe] appears to be universal, but in the world at large it is scarce," p. 437.

truth as the budding biologist; and for practical purposes of putting on fires in the room, and having the flooring and the walls freed from damp, she is, in a sense, the better of the two."

The Seed and the Soil are equally important, and this is recognised in every Insurance paper. "Have you been vaccinated or re-vaccinated?" Why is this asked? Does the fact of a person's vaccination or re-vaccination lessen the number of small-pox germs or scabs floating in the air as dust? Or, does it prevent their contact with the vaccinated? No. But it lessens the suitability of the "soil," in their persons, for the growth of these germs.

So in the case of tubercular disease. Which of us can flatter himself that he never gives entrance to tubercle bacilli? Let us think of the coughing and spitting which goes on in churches, theatres, and places of amusement (which are often so destitute of the disinfecting influence of direct sunlight); or in railway carriages, tramway cars, and cabs (which are so much used by invalids). Those of us in the medical and nursing professions are frequently stooping over phthisical patients while coughing, examining their sputa, or handling their organs after death, and so are still more directly exposed to the risk. If to this we are likewise to add what many contend for, the danger of infection from milk and meat, from tuberculosis in cattle, which is so rampant in our byres and herds, the liability to contact with tubercle bacilli almost baffles the imagination.

The "seed" is abundant enough, but what of the "soil"? It is here that a predisposition to bacillary infection comes in as such an important element from the Life Insurance point of view.*

The prevalence of the seed has already been dwelt on, and the quotation from the late Professor Coats may be again recalled: he stated that of those dying *from other than tubercular diseases*, 20 per cent. gave *post-mortem* evidence of a healed tubercular lesion in the lung. A still more remarkable communication by

* As Dr. Dickinson says (loc. cit.): "The seed is sown broadcast, and the vital question is not where it will be deposited, but where it will grow."

"Parfois la tuberculose décime certaines familles voire même jusqu' à leur complet anéantissement. Peut-être s'agit—il là d'une prédisposition à la contamination bacillaire." M. le Dr. E. Mosny: "Tuberculose Familiale," *Trans. of Brit. Congress on Tuberculosis*, vol. 2, p. 522, Lond., 1902.

"It is not unknown for all members of one generation or almost all to be swept off by it, each individual becoming subject to it, not when exposed more than at other times to the attacks of the bacilli, but on attaining the time of life most suitable to their development."—Dr. Dickinson, loc. cit., p. 1298.

Pizzini* states that in the case of those dying from violence or from acute diseases, *post-mortem* examination showed that 42 per cent. presented tubercle bacilli in their lymph glands: several cases of notably sound constitution showed the baccilli in the glands at the branches of the windpipe. What does such a state of matters mean? Does it mean that if these 42 per cent. had lived a little longer they would have become affected with phthisis? Certainly not. Some might, no doubt, have developed tubercular disease; but the large proportion, we may feel sure, would have been able to contend successfully against the bacilli which they had received, and so would not suffer any permanent injury from them.

The inherited constitution and the environment of the individual at his work or in his residence come in here to determine the issue. "One shall be taken and the other left."

It may now be proper to consider, critically, how far those are right who deny that tubercular disease and tubercle bacilli are actually transmitted from parent to offspring. Other notably infectious diseases are confessedly transmitted in this way. Congenital syphilis, for example, is well recognised: in many such cases the evidences of the disease do not appear for some weeks after birth, and in certain cases much longer intervals occur. If syphilis often requires some time to show itself in the baby after its birth, why not tubercle? Confessedly tubercular disease is not often to be recognised in newly-born or very young infants, but this is no proof that it does not already exist in germ at birth.

I have myself placed on record the case of a baby dying at six months of tubercular meningitis in whom I had traced advancing disease of the lung during life, ultimately resulting, as found *post mortem*, in cavities at the apex. These must have taken some considerable time to form; indeed, the baby was alleged to have had a cough and purging since birth; in any case the disease must have begun at a very early age.† Demme gives a case of phthisis in a baby dying when 12 days old which we cannot imagine to have been acquired after birth.‡ Three cases are recorded by

* Abstract of Pizzini's paper given in *Practitioner*, vol. 50, p. 217, London, 1893: "Tubercle Bacilli in Healthy Individuals" (quoted from *Zeitschrift für Klin. Medicin*, vol. 21, parts 3 and 4, 1892).

† Discussion on the Pathology of Phthisis Pulmonalis: Glasgow Pathological and Clinical Society. *Glasgow Medical Journal*, April 1881. See Dr. Finlayson's remarks on March 8th, 1881.

‡ Gerhardt's *Handbuch der Kinderkrankheiten*, Bd. iii., Heft. 2, S. 787. In addition to Demme's case various others are quoted of very young infants affected with cavities which must have been of some duration.

Goldschmidt, one of them dying when only nine weeks old, which are regarded by him with great plausibility as having originated before birth.* A case of congenital tuberculosis is quoted on the authority of the great pathologist, the late Professor Virchow.† A recent writer, who certainly does not err on the side of credulity in this respect, gives on a survey of reported observations of tuberculosis originating before birth—"Authenticated cases of intra-uterine tuberculosis, about 20 in human beings."‡ Such facts, even if few, cannot be lightly set aside as accidental or trivial; if these were found, how many were missed or never searched for? There is still some controversy and uncertainty as to whether human and bovine tuberculosis can be transmitted, or at least be frequently transmitted, from the one species to the other; there can be, however, no reasonable doubt that the two forms of tuberculosis are so far comparable as regards transmission from parent to offspring.

In a recent communication Professor Delépine, of Manchester, says that he selected four of the most healthy-looking calves he could secure, to test the transmission to them of human tubercle; but he frankly admits, regarding the very first of the four calves, that the tubercular disease actually found in its organs was not due to his inoculation, but had clearly originated at birth, or while in its mother's womb: in this apparently healthy calf, the disease had been transmitted from mother to offspring.§

A celebrated veterinary authority, Professor Bang of Copenhagen, is reported to have said, "I had occasion to observe more than 400 cases of tuberculosis either in fœtuses or newly-born calves."||

* *Practitioner*, vol. 52, 1894: also *Epitome Brit. Med. Journal*, 1894, vol. i., p. 14.

† Fränkel states he had this from Virchow's own lips. Gerhardt: *Handbuch der Kinderkrankheiten*, Bd. iii., Heft. 1, S. 170. Other cases are given at very young ages.

‡ George Ogilvie: "Germ Infection in Tuberculosis." *British Medical Journal*, Sept. 13th, 1902, p. 786.

§ Sheridan Delépine: "The Communicability of Human Tuberculosis to Cattle." *Brit. Med. Journal*, Oct. 26, 1902, p. 1224. "I concluded that this calf was affected with tuberculosis contracted *in utero* or at birth through the infection of the blood of the umbilical vein by bacilli derived from some tuberculous lesion of the uterus and placenta."

|| Quoted by Prof. Duncan M'Eachran: *Transactions of the British Congress on Tuberculosis*, vol. iv., p. 111, London, 1902.

Other arguments based on experimental enquiries on animals are perhaps less convincing, although they have a certain value. See "On Experiments proving the Infection of the Fœtus by Bacilli of Tuberculosis." *Transact. Brit. Cong. on Tuberculosis*, vol. iii., p. 362.

See also "Ueber den Bacillengehalt der Geschlechtsdrüsen." A. Jackh: *Virchow's Archiv*, Bd. 42, S. 101, 1895.

It is true he contends that a congenital form of the disease is relatively rare; but if one man saw 400 such cases, surely the direct transmission of tubercle from parent to offspring cannot be lightly brushed aside as so infrequent as to be, practically, of no account.

An important contribution to the discussion of the subject of heredity and tuberculosis has been made recently (1902) by Dr. Claud Muirhead in his survey of 21 years' mortality experience of the Scottish Widows' Fund (1874–94).* The view he takes seems very fair on the whole, and it is expressed quite in a guarded manner; but some may be apt to take an unduly light view of the influence of heredity from a casual reading of his report, or from fixing their attention exclusively on certain points.

Some of his figures are very striking and call for discussion or comment.

We find tables on pp. 48, 49 summarised thus on p. 51:—
"Among the 524 'consumptives' [dying of consumption] the "number who gave a history of actual family taint was 120, or "22·89 per cent., to which have to be added other 62, or 11·83 "per cent., who gave a history of suspicious family taint— "together 182, or 34·72 per cent. Among the 502 'non-con- "sumptives' [dying from apoplexy] the number who gave a "history of actual family consumptive taint was 117, or 23·31 per "cent., to which have to be added 120, or 23·90 per cent., who "gave a history of suspicious family taint—together 237, or "47·21 per cent."

We have here the remarkable result brought out that "non-consumptives" (apoplectics) have a much worse family history of consumption than those who actually died of consumption (47·21 per cent. as against 34·72 per cent.).

This tabulation seems to prove too much!

Dr. Muirhead points out one source of confusion in comparing such results:—

"The average age at entry of the 'consumptives' [dying of "consumption] was 31 years, while that of the 'non-consumptives' "[dying of apoplexy] was 38 years; and this additional seven

* "The causes of death among the assured in the Scottish Widows' Fund and Life Assurance Society from 1874–1894 inclusive." Reported by Claud Muirhead, M.D., F.R.C.P.E., Medical Officer of the Society. Edin.: R. & R. Clark, 1902.

"years would, of course, afford opportunity for giving a more "accurate and complete record of the family history" (p. 51).

This is very true; but, in addition, the more advanced age would give a better chance of seeing if the proposers, with a consumptive family history, were themselves shaping in this direction, and any proposers showing such indications would not be allowed into the Society, and so would not appear in the table at all. The figures given in a footnote below show a large number of deaths from consumption as occurring within five years of assurance; the average difference in age between Dr. Muirhead's "consumptive" and "non-consumptive" entrants was actually seven years.*

The distinction between the two classes is further illustrated incidentally by another table given on page 44:—

Of 254 "consumptives" 80·70 per cent. were *below* the average weight; of 152 "non-consumptives" only 40·13 per cent. were *below* the average weight.

Those apoplectics or "non-consumptives," therefore, in this table, who according to the report had a *worse* family history of consumption than those who subsequently died of the disease, had increased weight in their favour in 60 per cent. of the cases, and so owing to this better physique they would be admitted more readily, notwithstanding their bad family history.

The relative difference in weight, it must be pointed out, does not depend merely on the average age being seven years more in the "non-consumptives" than in the "consumptives" (p. 44):—

Between 30 and 40 years of age "consumptives" showed 27·95 per cent. below the average weight; "non-consumptives" showed 19·74 per cent. Their bad (or worse) family history as regards consumption was counterbalanced by increased age on the whole group, and by increased weight, with presumably improved physique, not merely for the whole group but for the same ages also (30–40).

In point of fact, we must constantly bear in mind the influence of insurance selection in considering the results of statistics obtained in this way.

* How much might happen in a few years as regards deaths from consumption is shown by Dr. Muirhead (p. 42).

No fewer than

15	members died of this disease in the first year of Assurance.			
34	,,	,,	second year	,,
35	,,	,,	third year	,,
52	,,	,,	fourth year	,,
50	,,	,,	fifth year	,,

186 out of a total of 806 deaths from consumption, 1874–1894.

In the earlier years of the Scottish Widows' Fund we are told that, about 1840, their rule "excluded from admission to the "Society all in whose immediate family more than one instance "of the disease had manifested itself" (p. 52). Such a rule would necessarily limit the evidence of consumptive disease in the families of those members of the Society who actually died of the disease. If, for the sake of argument, we take an extreme case and suppose the rule to have been still more stringent, and that a single case of consumption in the family had been held to exclude from the Insurance Society, then, of course, the claim papers of those dying of consumption would show NO family tendency at all to this disease, although, in point of fact, subsequent to the insurance this might have been of the most marked character.

The group of proposers in the apoplectic or "non-consumptive" tabulation with a notably bad family history of phthisis were deliberately taken *because* of their age and weight or physique giving good grounds for believing that they would escape this special danger, and in their cases this expectation was realised.

As already indicated, the mortality statistics of Insurance experience only show the family tendency to phthisis at the date of the proposal, as estimated, with more or less care, from the record of illnesses or deaths due to tubercular disease in the applicants' relatives, or rather in the relatives of those who have been accepted: they are not compiled from information as to such illnesses or deaths at the time of the claim.

Dr. Muirhead recognises all this: he shows that 46 per cent. of the consumptives entered under 30 years, and 88 per cent. under 40 years, "so that," as he says, "when they joined the Society "their family histories were not completed, and inevitably a "certain proportion of their immediate families would die of "phthisis (p. 47).

It is pretty certain that the worst family histories of consumption do not appear in Insurance returns at all; the worst cases do not apply, or if they do, are seldom accepted; or if accepted, they are taken for special reasons already alluded to, which give little chance of their appearing in the mortality returns of consumption.

Although it has only an indirect bearing on Life Insurance work, it may be well to inquire how far we should endorse a recent favourite dictum that "Tuberculosis is not so much a hereditary and incurable disease as infectious and curable."

Why should it be incurable because hereditary? Congenital syphilis is not usually regarded as incurable because it is hereditary. If heredity is admitted for tuberculosis, may not this make us the more careful, and so presumably the more successful, in so managing the young that the disease may never develop in a bad form? Residence, by preference, in the pure air of the country, and in as pure air as possible in the house and bedroom, whether in the town or country; careful attention to the nutrition of the young; avoidance of those catarrhs which are certainly associated with the development of tuberculosis, and are regarded by some as a distinctly determining cause;* avoidance, in such subjects, of overtaxing the strength by confinement and over-study while at school or college; the selection of an occupation in life which will not unduly confine indoors or lead to cramped positions of the chest or favour the breathing of "re-breathed air";† these precautions, and others of a like nature, are quite as likely in the offspring of tubercular stock, or in the community at large, to ward off tubercular disease as precautions taken directly against tubercle bacilli which seem so ubiquitous. The precautions referred to have this advantage, that they are likely to be more within the cognisance of the individual and his parents, and more within their power, than measures aiming at keeping the susceptible from any contact with tuberculous patients or from infecting bacilli.

Practical Applications of Foregoing Considerations.

I. It seems quite clear that Heredity (in its widest sense) must still be carefully considered and thoroughly searched out, in all its manifestations, in connection with tubercular disease.

Whether the liability is from actual transmission of the disease or from transmission of a tendency to contract the disease does not concern us from the Life Insurance point of view. When

* Prof. Sims Woodhead, whose experience as a bacteriologist and pathologist gives weight to his opinion, emphasises the importance of such attacks in relation to tubercle: "I think there is not the slightest doubt but that tubercular lesions are, as it were, superimposed on catarrhal pneumonias. Further, I believe that a perfectly healthy lung is seldom, if ever, primarily infected by the tubercular bacilli" (MS. communication quoted by Dr. Dickinson, loc. cit., p. 1299).

† Henry MacCormack: "Consumption as engendered by re-breathed air," etc. 2nd edition, London, 1865.

this family tendency is very marked, the doctrine of bacillary infection does not lessen its weight in the least.

II. An early age in the applicant—before the family history is fully developed, and before the proposer's health and constitution are consolidated—must make us more cautious in dealing with those presenting tubercular tendencies in their family history.

III. The hereditary tendency acquires special importance in the light of personal antecedents or conditions in the proposer, such as the occurrence of certain illnesses usually or often of a tubercular nature, *e.g.* pleurisy in young manhood; glandular affections in the neck or elsewhere; recurring or persistent colds; catarrhal pneumonias and so-called congestions of the lungs; being "run down" from over-work, over-study, over-growth; recurring dyspeptic symptoms; still more, of course, such definite symptoms as spitting of blood, fistula in ano, bone and joint disease, &c.; physical signs of disease in lung are usually quite prohibitive.

IV. A bad family history of tubercle is particularly grave when proposer shows a poor physique generally, and very specially with deficient weight, relatively to height and age; also, with poorly-developed or badly-shaped chest, and deficient expansion during inspiration.

V. In cases with tubercle in the family, we must seriously consider the occupations which are known to favour consumption: needle-grinders, stone-masons, &c.; compositors, watchmakers, engravers, &c.; workers in close rooms, as is often the case with tailors; spirit salesmen; waiters in hotels and clubs; keepers of large lodging-houses, and generally where the sleeping accommodation is bad.

VI. In those predisposed to tubercle, living in towns, and especially in crowded localities or houses, and perhaps even more in crowded or badly-ventilated factories, offices, and workshops, is potent for evil.

VII. As the family history may indicate a suitable soil for the growth of tubercle, much importance attaches to exposure to tubercular infection when this is known to exist, although it is

seldom likely to be ascertained from the proposers for insurance. The existence of phthisis in the dwelling, especially in the case of a husband or wife being affected, and indeed where any member of the household is affected with advanced consumption, must be specially noticed when possible.

[VIII. and IX. Actual deficiency of food, however potent in favouring the occurrence of tuberculosis in those predisposed to it by heredity, need scarcely be considered in connection with Life Insurance; proposals are seldom made (for their own lives at least) by those so destitute as to lack ordinary food.

Intemperance, also, however potent as favouring consumption, need not be dealt with here, as such cases, if suspected, are rejected on other grounds.]

Per Contra—There are favourable points which may be set against a family history of phthisis or tuberculosis:—When the age is such as to have given time for a fairly full disclosure of the family history, and for seeing that the proposer has stood the strain of life in early manhood; freedom from any serious or suspicious illnesses in the past of the kind already referred to; good physique, good digestion, good weight, and well-formed chest; occupation not involving confinement in close rooms or in cramping positions; residence in the country and in a good house; no association with tubercular cases, especially in the family or household.

All this is merely applied common-sense; these principles have always been recognised and acted on in Life Insurance; the object of this address is to show, in a detailed manner, that the discovery of the Bacillus Tuberculosis has not upset them in the least.

JAMES FINLAYSON, M.D.

Insurance and Actuarial Society of Glasgow,
January 12, 1903.

INTERMITTENT ALBUMINURIA IN RELATION TO LIFE ASSURANCE.

FIRST of all, we must understand the meaning of this term "Intermittent Albuminuria." It is used here in a technical sense, to indicate a more or less definite group of cases. It does not mean simply an albuminuria which intermits. Some of the gravest forms of Bright's Disease, particularly cases of granular kidney, frequently show an absence of albumen either at particular times of the day, or at particular periods of the illness: this is especially the case in the earlier stages of the disease. In such cases, the urine may often be free from albumen in the morning, before breakfast, while quite recognisable later in the day. I could give some striking illustrations of errors from want of consideration of this fact. Such intermissions do not constitute the case one of "Intermittent Albuminuria."

Perhaps I had better try to define what is meant by the term and refer to the various names applied to this group of cases. I quote from the last edition of my "Clinical Manual" (1891), p. 506.

"*Functional Albuminuria: Cyclical or Intermittent Albuminuria.* Under these and a variety of other names, a form of albuminuria occurs, chiefly, as supposed, in adolescents; it has been thought to be almost physiological in character, that is, not symptomatic of any grave disease. The leading clinical feature is the occurrence of the albuminuria at particular times, and its complete absence in the samples passed on rising from bed in the morning. It sometimes seems to be dependent on circulatory peculiarities, and to be induced by getting up to the erect posture, or by muscular exertion; in other cases it seems to be related to food-taking and some peculiarity in the digestive process. In most of these patients, the albumen appears in the forenoon, after breakfast; in some, in the afternoon also, clearing away in the evening. At particular times of the day, the albumen may be very considerable, and quite absent at others, the explanation of these oscillations being sometimes obviously related to food or exertion,

etc., at other times very obscure. The quantity, colour, and specific gravity of the urine are normal. As a rule, no tube-casts are found, although a few stray hyaline casts being present does not exclude this diagnosis. Such patients seem to have no symptoms referable to the kidney, the detection of the albumen being due generally to some accidental circumstance, as in life insurance examinations of persons who are considered quite healthy, or from the occurrence of some other illness in the person affected."

Attention has been directed to this form of albuminuria since the year 1878. The detection of such cases often occurs by an accident of some kind; and of late years, since many Insurance Offices insist on the urine being examined in all cases, this accidental detection often arises in connection with a Life Assurance examination. Or, again, the routine examination of young persons in schools, or for admission to certain services, may bring the albuminuria to light unexpectedly.

In 1875 my attention was directed to the case of a friend of mine, a young girl of 15. Scarlet fever had appeared in the family, but she was supposed to have entirely escaped; whether this was so or not could never be definitely settled. Owing to some confusion in procuring samples of urine from other members of the family, hers was examined by accident, and I was surprised to find it albuminous. Under the circumstances, she had to be treated as if we believed her to be the subject of nephritis following an unrecognised attack of scarlet fever. Notwithstanding very strict dietetic measures and other precautions, the albumen did not disappear. The health was never bad, although grave anxiety was felt, for some years, lest she should develop genuine Bright's Disease. In 18 months the notes bore:—

1876. Sept. 29.—No albumen at night.

Sept. 30.—None in morning sample, sp. gr. high; urea abundant; uric acid crystals. After early dinner, albumen a distinct trace. After being out at tea, tested at 8½ p.m., minutest trace of albumen.

Oct 1.—Before breakfast, no albumen. After breakfast, and after being at church, albumen abundant. At 5-6 p.m., after tea, albumen very small in amount. 10 p.m., a little more, but still slight.

Oct. 2.—Before breakfast, sp. 1026 : no albumen.

Soon after this date my attention was arrested by the descriptions being published in the journals of this "Intermittent Albuminuria" in adolescents, and I began to take a less grave

view of the prospects of the case; but it was some time before these fears could be quite allayed. Gradually, however, the condition was such as to give me confidence in classing it under this head. The lady is strong and energetic, and cycles long distances for days in succession. She has shown no signs of dropsy at any time, and no indications of vascular disturbance. No opportunity has been afforded of showing what effect marriage and its consequences might have had on her kidney. The urine has not been tested for some time, as it is not desirable to direct her attention unduly to the subject; but when tried some two years ago albumen was still present in afternoon or evening samples.

A typical case of this form of albuminuria occurred in connection with a Life Assurance proposal. Two brothers were proposed, both tall, of good weight, and powerful aspect. The older, æt. 18, was delayed owing to the presence of albumen being detected, although I stated my opinion that it was probably a case of this class, and so likely to be passed if a little time were given for its observation. On December 29th 1900, and January 14th and 22nd 1901, there was a minute quantity of albumen found in the afternoon. There was the usual irritation created by this delay, although less, perhaps, than usual, as the father was a man of discretion, and the private medical adviser was quite alive to the points in the case.

The lad's urine was tested at a public school at which he was still resident, and the school doctor reported the urine normal, after two examinations; but when he came to me, on April 17th 1901, it was still albuminous to a very slight extent. On the 22nd of the same month, as it was found albuminous again, the sample was sent to his own private medical attendant, who endorsed my observation, and agreed that delay was necessary before insurance could be carried through. In October, the same doctor reported to me that he had examined four specimens, and had found no albumen; he admitted, however, that a sample I tested on the afternoon of October 18th contained some albumen, but, curiously enough, one passed an hour or so later contained none. On November 6th, an afternoon sample contained an undoubted trace, but so small that it might have been easily missed if not specially scrutinised, and on the afternoon of November 7th 1901 it was barely recognisable. Being now satisfied of the nature of the case, I recommended the life, and my Directors passed the case at the ordinary rates. He remains

free from symptoms; but as yet little more than a year has elapsed.

I have said that the condition is often detected by accident, and it is natural that such cases should come more readily under our notice when medical men or medical students are the subjects of this "Intermittent Albuminuria."

A medical friend and former student of mine was passed for Life Insurance in December 1885, being then 28 years old, having graduated in 1880. About the time of graduation, albumen was detected in the urine, to some extent by accident, at least he had had no renal symptoms. For five years the albumen was known to be present in an intermittent manner, present during the day, absent at night and in morning, coming on with muscular exertion, as it seemed. I was consulted about the condition soon after its detection, and although a certain pallor of the young man's face gave some anxiety, I soon came to the conclusion that the case was one of "Intermittent Albuminuria," without gravity as regards prognosis. He got into a large practice, involving considerable fatigue. On consultation, I advised him that as regards work, marriage, and the management of his life generally, he should be guided by his own discretion apart altogether from this albuminuria. Partly on my report, he was recommended by one of my predecessors and accepted at seven years extra, as it was thought that the fact of the albuminuria could not be wholly disregarded. A distinguished physician, closely associated with proposer at one time, took an even graver view, and evidently did not accept my more hopeful diagnosis.

In January 1890, the case was again before our Board; although albumen was still present during the day, he was now accepted at three years extra.

The satisfactory point is that for the last three years or more the albumen has been always absent when searched for, and the proposer has conducted for fully 20 years now a very extensive practice. The distinguished physician referred to above rejoices in this result, although he had evidently feared that the proposer might have become a definite victim of Bright's Disease long ago.

Another medical friend of mine was known to have been the subject of an "Intermittent Albuminuria" for some years. The notes made by himself in November and December 1888 showed albumen only on three occasions, after dinner, out of 12 consecutive days. Occasionally, a little albumen was found after

breakfast, for a short time only. After a period of observation by myself and also by him, we came to the conclusion that the case was one of this form of albuminuria, and I examined and recommended him for insurance in one of the leading Scottish Offices. He was accepted, in December 1888, for an endowment payable at 60 at the ordinary rates, being then 32 years old, and having been in active practice for five or six years. A further insurance, on the same terms, was effected two years later in the same Office. Here, again, I have had definite information that the urine has never been found albuminous for the past year or two, when tested from time to time, although not regularly. He had never presented any signs of renal disease beyond the albuminuria and perhaps a little pallor.

A third case of a medical practitioner was detected in connection with a projected proposal for life insurance shortly after beginning practice; albumen was detected before the case went on, and it was not persevered with. The proposer came under my notice lately in connection with another proposal for life insurance, which, however, was not carried through, as it was declined for other reasons, although I had thought he might have been taken on certain conditions. So far as the urine, however, was concerned, it was examined twice for this proposal and found quite free from disorder by two separate examiners. The following letter gives a very good account of this case, and as the proposer had no interest to conceal anything, his observations may be trusted. He wrote it, at my request, as a matter of scientific interest after the case was declined:—

29th Sept. 1902.

I find my albuminuria was observed first in August 1888. It was markedly postural in character, as it seldom appeared in the urine passed on rising. At no time were tube-casts found. The worst period of the day was about an hour after rising. I believe that during the first year the urine passed on rising did occasionally contain albumen, but I am certain it ceased to be observed after that. Though I did not make regular examinations, I am confident it was to be found daily present, though in slight degree, till about 1898, *i.e.* for 10 years, when I found it absent on making a casual examination, and it has never reappeared since. I have tested it several times when I have been on duty for 18 to 20 hours continuously, and found it invariably free.

The last case I have to mention was that of a young man who,

when 24 years old, applied for insurance in July 1895. Albumen was detected, and the case was postponed for a time. He was examined by his own doctor, who maintained that there was nothing wrong with the urine, but there was reason to believe that he was not accurate. The proposal came up again, and I was asked to test the urine, and found no trace of albumen in September 1899, and I suggested that a detailed report from his new medical attendant, whom I knew to be careful, would be helpful. The report appended was so careful and satisfactory, and indicated the characteristic behaviour of this form of albuminuria, that I thought, if forwarded to the examiner who had delayed the case four years before, he would be able to recommend him. Accordingly, he was accepted at ordinary rates in October 1899, by a leading Office. I had occasion to see this young man in connection with some other disorder, and found his urine quite free from albumen in January 1903. It has been tested repeatedly since by his own doctor, and found quite free.

GLASGOW, *9th Sept.* 1899.

Mr. B. first consulted me in March 1897, on account of the presence of albumen in his urine, although otherwise he felt in perfect health. He stated that the albumen had been accidentally discovered, two years previous to his visit to me, by Professor Gairdner when examining him for life assurance, and that on account of this fact he had been deferred by the office. In the interval (between 1895 and 1897) he had, on the advice of Dr. G., been taking arsenic in small doses, with varying intervals of interruption, and being by this time quite expert in the examination, he was able to tell me that frequently, for weeks on end, he would find his urine perfectly normal, but occasionally, without any apparent provocation, albumen would be found in the urine. With this history before me, I took pains to go thoroughly into his case, examined him completely and carefully, inquiring in detail as to his mode of life, habits, &c., and got samples of his urine sent me passed at different times of the day, viz.:—I., a mixed sample of last evening and first morning voidance; II., a forenoon sample, the first voidance after breakfast; and III., a late afternoon sample, the first passing after dinner. The result of all this examination was that while I could find no deviation from the normal standard of health anywhere—in fact, his general standard of health was what I would call exceptionally good—the urine examined two or three times weekly, for several weeks, almost invariably gave the following results, viz.:—Sample No. I., perfectly normal. Sample No. II., a distinct trace of albumen. Sample No. III., a trace of albumen, but less distinct than No. II.

As a rule, all the samples had a uniform sp. gr. (1020); they never contained any abnormal constituent, *e.g.* sugar; and microscopical examination revealed no tube-casts. A peculiar circumstance was noted and verified on several occasions, that on Mondays, samples after the Sunday's rest (which he at first took on my recommendation) contained a markedly larger quantity of albumen than the samples contained throughout the week. With all these facts before me, and although I considered even then that the condition was that which we term "cyclical" or "functional albuminuria," I put him on a careful diet, regulated his exercises (he was at that time a "harrier"), and advised him to take iron tincture for a couple or three months; when holiday time came, he took also on my advice a month's sea trip up the Mediterranean. On returning from his holiday, I could discover no albumen either in Nos. I., II., or III. samples. He had increased in weight by 10lbs., and in every way looked as healthy as any man could be. A month later, however, he discovered albumen himself, on examining a forenoon sample, and called on me to confirm it, which I was able to do; but although I examined it frequently afterwards, I was never able to verify its presence again. I have not examined his urine for 8 or 10 months up till last Wednesday (6th inst.), and there was still no albumen discoverable. Looking at the whole case now, I am more than ever convinced that the occasional presence of albumen in the urine meant no pathological changes of any moment (if at all) in the kidneys, and I base that opinion on the general condition of the applicant's health; the temporary character and small amount of albumen; and lastly, on the important fact that, even when the albumen was most evidently present, it always decreased or even entirely disappeared by exercise.

JAMES HAMILTON.

These last four cases, occurring in Insurance practice, are very encouraging, in this respect, that when watched over a long period the albuminuria was found ultimately to disappear entirely, and to remain away for years. The case of the lady shows that even if persistent, as watched over a period of 25 years or more, it has in no way interfered with her health or her activity.

JAMES FINLAYSON, M.D.

Insurance and Actuarial Society of Glasgow,
January 12, 1903.

MEDICAL EXAMINATIONS.

It is with a considerable feeling of trepidation that I venture to read a paper before such experts as yourselves, feeling sure that on many of the points involved you are already better informed than I am, and that in a great deal more of the subject matter I shall run the risk, to use a homely phrase, of bringing coals to Newcastle.

The apparently simple performance of examining an individual with the object of ascertaining whether any special risk is associated with his life; whether for any reason he is unlikely to attain the average span of years, is in reality, as I hope to show you, a very complex, far-reaching, and therefore interesting investigation. That this is so is now generally recognised by the medical profession. The examination of persons for life assurance has become elevated to the rank of a speciality, and this year 1899 (now so nearly over) has seen the creation of a special section of the British Medical Association to devote particular attention to the subject in its manifold bearings. In many ways such a department will be mutually productive for the medical profession and for the assurance world. At present the opinions given in very many cases of lives depend largely on the views of the medical examiner based on a limited number of cases observed by himself, owing to the difficulty of reliable statistics being obtained in many even common conditions. Obviously such views may readily be fallacious if applied to these conditions in general. For example, take a very common form of chronic heart disease, in which one of the valves of the heart, called the mitral valve, has become damaged. Now, one doctor who sees such cases amidst the working classes says the outlook is bad. Another, whose experience lies among wealthier and more leisured patients, has equally good ground for taking a rosier view. The views of these local medical officers are placed before the Company's consulting physician, whose practice probably includes both the hospital and wealthy class, and he very likely steers a middle course. But if

he wants actual statistics on the point, where can he find them? Now let us see what it is that he wishes to know. It is, given an ordinary case of mitral valvular disease, presenting no marked symptoms, what is the ascertained average duration of life—age, general condition, occupation, etc., being, of course, considered? On this point a sufficiently large and reliable number of observations is at present non-existent. General impressions only are obtainable. In private practice such cases rarely come before the doctor, except on account of other ailments, or until signs of failure of compensation become evident; their hearts, luckily for them, not engrossing much of their attention. We only see them in hospital for complications of their trouble. In the poor law infirmaries the closing stages may be witnessed. So that one person may see the start of the condition, no note is made; and years after, quite different observers see the final result. And between so many it becomes no one's business to give a consistent and continuous record of such cases. Now, the mere fact that the difficulty in being definite here is due to the great number of years the above-mentioned cases run, will at once show you that they are far from being unassurable. Of course they should be loaded, but how much? Now, if they were accepted at rates estimated as carefully as possible by present methods, and then actuaries tabulated the results, you would eventually have a just way of estimating the risk, and we should be on safer ground in giving a prognosis to our patients.

This introduces another matter, the need for a uniform examination. Now, one Company may be more successful than another on account of the greater financial ability of its directors, the greater energy of its staff, etc.; but any attempt to overreach another by a more slipshod medical examination must sooner or later turn a spurious success thus gained into real disaster. It is almost superfluous to tell you, gentlemen, that success in general depends on the careful appraising of each individual risk, and that this must be the conjoint work of professional actuaries and medical advisers. And the thoughtful public must see this. If a man of undoubted first-class stamina finds that he is paying the same premium for a stated risk as his next-door neighbour, whom he knows to be a weakling, he at once feels justly dissatisfied with the whole affair. It therefore cannot be to the advantage of any Company to undersell another by offering as an inducement a more lax medical examination. The medical examination should

be as thorough and stringent as possible, and this will be rendered easier by making it uniform, so that the public learn what to expect. Again, it has been suggested to accept these damaged lives at loaded rates, but, provided they do not die early, to return the excess paid above the normal rate; or, if they die from some cause not connected with the adverse circumstance, to make allowance for this. For example, suppose the man with the damaged heart is assured at loaded rates, but dies in a railway accident—then the amount assured, plus surplus risks paid, to be returned. But such course is an error. The individual was accepted at an increased rate, not because he was certain to die before his healthier fellow, but because not being absolutely sound the general mortality rate for such cases must be and is higher than the normal rate. And the public generally, good and fair lives together, are not unfairly assessed, in spite of the grumbling one hears sometimes. The late Mr. M'Candlish, at one time President of the Faculty of Actuaries of Scotland, stated that taking the larger British offices the average surplus is equal to 25 per cent. of the premiums received. But even this is largely returned in form of bonuses to the assured. Of course one does not mean to affirm that lives all round are only accepted up to 75 per cent. of their value. Many other factors are involved—working expenses, conditions of invested funds, etc. And if any further doubt existed on the part of the public, the very keenness of the competition in the assurance world ought to dispel it.

Still one is rather of the opinion that good offices do look too much askance at partially damaged lives, and that the returns are based too largely on first-class risks only. It is essentially the element of doubt as to the length of life in individual cases that creates the success of assurance, and this doubt is very much more potent in the case of a damaged life than in a perfectly normal one. Thus the chief outcome of this joint investigation would be to equitably assess these particular cases, and to offer the great benefits of assurance to them also. Life assurance is primarily a scientific business, but when its benefits are more generally extended to those who are continually haunted by the fear of being cut off before they can provide for those near and dear to them, it will be at the same time the grandest of all philanthropic agencies—helping only those who try to help themselves, and distributing the best of all tonics, freedom from ceaseless care for to-morrow.

Now, gentlemen, let us take the examination a little more in detail. The inquiry is divided into four parts—(1) The family history. (2) The past history of the individual. (3) His or her present condition. (4) The summing up, or prognosis as to the condition so many years hence.

1. The Family History.

To start with the mere record of whether parents are alive or not, taken alone, goes for little. For instance, a little child a few days old would naturally have parents living as a general rule, but the value of the parents being alive increases very much with the age of the proposer, until, if a proposer 55 years old has parents both living at near 80, the fact becomes obviously a distinct point in his favour. In fact one would almost go as far as to say, if you wish to live long, choose a long-lived ancestry, great age being undoubtedly hereditary. It follows then, especially in young people, say about 20 years, that the details as to grand-parents are possibly just as important. Again, if a parent is dead—especially from an infective disease, including here phthisis—knowledge of the forerunners of that parent is especially valuable. Again, a knowledge of grand-parents is valuable in connection with what is known as the "law of atavism," from the Latin "atavus," a grandfather. Although the law of atavism is a bit at a discount nowadays, it is as well to remember that the tendency to diseases may skip a generation—for example, gout often does so. This may be largely due to the fact that a man may, by avoiding the evil example of his father, escape his father's fate; while this man's son, having no such inducement to keep him in the narrow and ofttimes monotonous path of rectitude, speedily falls a victim. Again, in such matters as alcoholism and insanity the influence of heredity is very important, and for an opinion to be of much value it must include grand-parents. And apart from what they actually died of, if one finds that a proposer's parents and grand-parents have died early, *e.g.* all about 55 years, one always feels a little doubt. Now, as to the parents, the presence of phthisis, rheumatism, and gout are certainly adverse factors, but to what degree is as yet uncertain. Take phthisis. Certain investigations have shown that 25 per cent. of phthisical cases of the hospital class yield a history of phthisis in one or both parents. But against this we must place firstly the fact that all these cases of phthisis did not die of it—consumption has not a mortality of 100 per cent.—and that we

have insufficient data as to the percentage of phthisical parents yielded by the healthy population. It certainly does not mean that a fourth of the offspring of tubercular parents will be tubercular.

As a matter of fact, the subject of what is popularly called "hereditary consumption" needs further investigation. There is no doubt that the danger has in the past been greatly exaggerated. Quite recently reliable observers have maintained that the offspring of tuberculous parents—apart from direct infection from the parent, which can be prevented by separation—are even less liable than the general public to become tuberculous. Further, that if the offspring do become tuberculous, the duration of the disease is longer in them than is phthisis in the offspring of the non-tuberculous—that is, the offspring of the tuberculous show greater resistance to tubercle. There is much to be said in favour of this view, both in fact and in theory; and it is in a measure borne out by observations on animals, as tubercular cows in Denmark. The important question to a proposer is then, "Have you been at any time especially liable to tubercular infection, *e.g.* from relatives?"

Then as to rheumatism, the difficulty is still greater. About 30 per cent. of rheumatic cases have a hereditary history. But rheumatism is comparatively seldom directly fatal, and statistics are very scarce. With another class of cases—cancer—the difficulties are so enormous that each individual case must be taken on its merits. Mr. Cripps has shown, however, in the St. Bartholomew's Hospital Reports for 1878 that the proportion of deaths from cancer among parents and grand-parents of cancerous patients is scarcely larger than the proportion of deaths from cancer is to the total number of deaths from all causes in this country. This suggests that the risk of transmission of cancer has been exaggerated. But this again needs much qualification. Cancer is a term including very many forms of disease, showing in common a certain tendency to progress, and destroy life. But the forms are in many cases widely different, and will not bear grouping together in a haphazard fashion. This introduces another uncertain element—the indefiniteness in many diseases on which the Registrar General's Returns are founded.

So you see with regard to our deductions from family history much remains to be learnt, and so far parents and grand-parents have been dealt with, not other relatives. Reverting once more

to the question of phthisis, researches by Dr. Sprague, late Manager of the Scottish Equitable Life Assurance Society, and Mr. Manly, Actuary to the Equitable Life Assurance Society, in conjunction with Dr. Glover Lyon, in the results of assuring lives where parents have died of phthisis, show that although there is an extra mortality the extra rate generally charged is more than is necessary. And in view of the fact that consumption is certainly shown to be much more curable than was hitherto thought, by means of certain methods of treatment, especially open air, such extra rating, unless modified, will become more and more divergent from an equitable rate, as treatment becomes more and more successful. The great difficulty in this matter is how for statistical purposes to define a "cure." At all events after a time there must be more agreement as to the average duration of life after tubercular infection, modern methods of treatment having been carried out. In the nature of things the average duration will be very different in the cases of the working classes and the well-to-do and leisured.

Now, as to the deductions to be drawn from health of brothers and sisters, considerable value may be attached thereto as confirming or otherwise our views as to the presence of any hereditary taint—with limitations, of course. Thus phthisis, and cancer of the parts concerned in child-bearing, are more hereditary in girls; cancer of the mouth, stomach, and gullet in men; gout and perhaps rheumatism in males. But the value of evidence of disease in brothers and sisters depends very largely on their ages. In fact, much stress cannot be laid on early deaths in a family, except from tubercular troubles. By "early" one means here infantile. With this very hasty scanning, too hasty one fears to be accurate, one must leave "family history." You will see, however, that it is important and far-reaching, and would it not be better if every proposer received, before being medically examined, a form to fill up concerning family history? This could be done leisurely, accurately, and without the often unconscious leading questions of the medical examiner. Then he need only question as to any doubtful point. As it is, in many cases he has quite insufficient data at the time of examination to give an unqualified judgment. The ease with which the public records are inspected, combined with the anxiety of the would-be assurer that no statements made might be hereafter called into question, would sufficiently guarantee good faith. And again, if such course were usual, it would soon become acceptable to the public.

Now, as to my next sub-division—the past history of the individual—it may be taken as a general rule that "the boy is father to the man." A person who has run the gauntlet of many more or less serious diseases may escape apparently unscathed, and certainly has proved his power of resistance. But that is not saying that that power of resistance has not been diminished in the process. The best man in this connection is the man without a medical past. One mistrusts those people who have had everything. One knows, for example, in scarlatina how very often the patients are on the verge of Bright's disease, and scarlatina, plus a readiness to catch cold, would give one a certain uneasiness about such a person's kidneys. So that the fact of having had even the so-called protective diseases—such diseases, that is, that never or seldom recur in an individual—is no inducement to accept them. Rather the reverse—for example, typhus fever, typhoid fever, and scarlet fever. In some families fevers are rare even when the members are subjected to considerable risks, in others the fevers levy a heavy toll. This interesting topic of "susceptibility," however, must not be dwelt on here, as it rarely comes into calculation except in special cases, generally in connection with climatic risks, as typhoid and cholera in India, yellow fever in tropical America. There is one protective disease, however, that a patient should have had, that is vaccination; and Assurance Companies should have a very real and conscientious objection to accepting unvaccinated or even unrevaccinated persons, for it is as certain as any deduction well can be based on statistics, experience both in the distant and immediate past, and daily observation by an army of skilled observers in fever hospitals, etc.—that, at no very distant date, claims from smallpox, if the Companies do not protect themselves, will be excessive. If affairs go on in this country as they seem to promise, some of our Companies, especially the great Industrial Companies, will have accepted much unprofitable business.

The effect of great epidemics has been small on the average mortality over extended periods of time, but the great outbreaks of smallpox cannot be negligeable, any more than the recent cholera epidemic in Hamburg.

A question often asked on medical forms is, "Has the applicant had syphilis?" Might that not be altered to "Does the applicant show any obvious signs of having had syphilis?" It is a little too much to expect a truthful reply to such a question put by a

strange doctor. On the other hand, it cannot be answered without being asked, and is a temptation to the examiner to take the answer for granted, especially as the mortality is very small, and the incidence of the disease in private practice probably under 4 per cent. Also, the sufferers generally make a point of getting cured, and the disease is protective. Such questions are open to the grave objection, from a proposer's point of view, that the medical report passes into the hands of non-medical officials—confidentially, of course, but still it does do so.

We come now to a very important sub-division of the subject. Some diseases, unlike those spoken of above, show a marked liability to recurrence. For example, rheumatism. Rheumatism is *per se* not very fatal—probably only about 4 per cent. of the acute cases. But the complications left behind are very often serious, and the ultimate mortality, although impossible to estimate, is large, and a patient once having had rheumatism is far more likely to have another attack. The later the incidence of the first attack the better; but heavy loading should be always the rule. Bronchitis, and a general tendency to catarrh, are also cases in point.

The effect of applicant's habits, except obvious effects, we will pass over, as proposers rarely, so to speak, "give themselves away" if appearances are not against them. The chief information on this point must be looked for from other sources than the medical examiner.

Having disposed of the family history, and past history of the individual, we go on to ascertain the present condition—always bearing in mind the object of the investigation—viz., probable duration of the life. We are not examining for the army, police, or merchant navy, and many minutiæ occasionally seen on assurance forms might well be left out. We do not want to detain the applicant too long; and he is generally pleased when he has "done with the doctor." The time spent on some details might with advantage be devoted to the main object, that is, investigation of the condition of the vital organs. Such questions as to colour of hair, eyes, complexion, etc., are superfluous. General appearance is certainly a guide. A sallow, cadaverous, hectic, or jaundiced appearance will be a great guide to the examiner. The general verdict healthy, unhealthy, or suggestive in appearance (*e.g.* of alcoholism) should suffice. It is part of the art of the doctor to take note mentally of small details—the posture, gait, manner of

breathing, speaking, etc., etc.—details often so indefinite as to be almost indescribable, yet yielding really an often astonishing amount of information. But for assurance purposes prolixity must be avoided. All that is wanted is to look for a suggestion of disease, and then go on to confirm or otherwise.

Next come weight taken in conjunction with height, chest and waist measurements. You will see that waist measurement is mentioned. It is for this reason. Excessive weight is an extra risk, but if the applicant's undue weight is pretty generally distributed, it is nothing like such a bad factor as when the extra fat is all packed away in the abdominal cavity, making him so scant of breath that the least extra exertion seems almost tempting Providence. The all-round risk of insuring fat people is increased. This is somewhat counterbalanced perhaps by some immunity from tubercle, but the abnormality of the death-rate in fat people, not marked at first, becomes very marked with lapse of time.

The condition of the vital organs is the most important part of the whole inquiry. It is, however, such a technical subject that we will not attempt to discuss it here. But you will at once appreciate the difficulty we have in groping in the dark for an abnormality which perhaps does not exist. It is more difficult, generally speaking, to say what a man has not got than what he has got. To tell a man he has a cough when he comes to tell you the same thing is easy, but to take a strange person and say this man's heart, lungs, kidneys, nervous system, etc., are all working normally, harmoniously, and in perfect order, is the kind of thing that fools step in to do, while wise men tread very warily. And to go further still, we are often asked to give such an opinion without examining some of the organs. For example the urine—how can one give an opinion about the kidneys without examining the urine? In the case of women it is recognised that only a partial examination is possible, and extra loading adopted. Indirectly, by the way, a testimony to the value of medical examinations. On the numberless variations of departures from the normal which require consideration, one cannot touch here. Luckily for the human race, many of these have no direct bearing on the mortality rate, and can be speedily eliminated in this connection. And we must not forget that we must all die of something or other, and that the duty of the medical referee is more strictly to detect any evidence of premature decay. One

thing may be mentioned—the effects of occupation and social position. Take the very heart cases mentioned, our views must materially differ as to outlook in the case of rich and poor.

About the fourth division of the subject little remains to be said. All along we have been weighing the pros and cons of our applicant's family history, his own personal history, and then gauging his present state. Here and there a slight adverse fact has come out—in itself perhaps hardly weighty enough for a bad mark—but now we deal with the summation of all against him, and all in his favour. Probably in this state of our knowledge the division of cases into unimpeachable lives, slightly impaired, and unassurable is about as far as we can go. It has been thought that the addition of slight extra rates has been needlessly irritating, but surely, when our knowledge on the point becomes sufficiently definite, such course will become justified. We aim at accurate valuation of each case, and the nearer we get the better and fairer it becomes to all concerned. Because the applicants are dealing with a Company (mutual or otherwise) is no reason why they should have the benefit of any doubt. Of course we can never eliminate chance in the individual, but can do so in the aggregate.

In conclusion, gentlemen, the object of the medical examination is not the selection of lives but the classification of lives. At present, owing to our want of fuller knowledge, undoubtedly it often does become a case of selecting only the best. But that is because you know the value of the best lives, and in the others there is a natural shyness of dealing in unknown quantities. If medical examination were non-existent, selection would take place just the other way, with the result that many bad lives would be speedily assured. We may take it that although the rates charged by the best British offices are not unduly high, the loading of partly damaged lives is as yet only approximate. That the more exact estimation of the extra risk attached to definite cases of damaged lives will be fairer both to them and the unimpaired. That this can only be brought about by the application of the statistical methods of the actuaries to the cases carefully classified by the medical officers. That the careful classification of the cases is the primary aim and object then of medical examinations. And that a more uniform medical examination will materially assist in the attainment of this object. Then, although the inquiry is

primarily directed with a view to business requirements, the ultimate gain to medicine and mankind will be great. What the public require is a definite statement. Thus, how can we, for example, hope to get public opinion to denounce the intermarriage of tuberculous persons when we cannot even represent the risk? We ourselves cannot say how much misery the world would be spared. To hope that we shall ever control the popular mind sufficiently to be able to put into practice much of what we hope to learn further about the natural history of disease, is perhaps too long for the realisation of a Utopian dream. But our stimulus is our own honesty of purpose, and hope for the future. And in the furtherment of such ideal, the medical profession itself is, and will be, in great measure indebted for the accumulation of reliable data to those great institutions—the Life Assurance Companies.

VINCENT MOXEY, M.R.C.S., L.R.C.P.

Bristol Insurance Institute,
December 30, 1899.

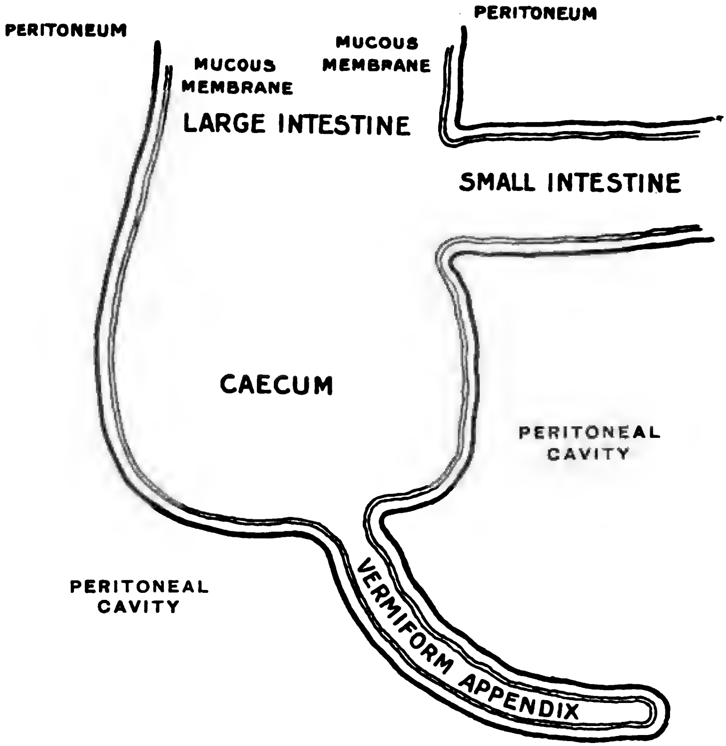
APPENDICITIS IN RELATION TO INSURANCE.

THE alimentary canal of man consists of a long and complicated tube of which the various parts are named the gullet, stomach, small intestine, large intestine, and rectum. Of this tube the greater part, including the whole of the intestines, lies within the abdomen and is there covered over by a very extensive, delicately constructed, and easily inflamed membrane known as the *peritoneum*. This peritoneum also lines the walls of the abdomen, and, being reflected thence in a large number of complicated folds, which cover the abdominal contents, it encloses a great cavity—the peritoneal cavity. In health this cavity is empty and its surfaces are everywhere in contact with one another, but in disease it very readily becomes filled with fluid which has at times free access to all its parts, distending it and sweeping over it the products and the causes of inflammation.

Inflammation of the peritoneum is known as *peritonitis* and constitutes a somewhat common disease which is often fatal. For the present purpose it is only necessary to note, further, that peritonitis may be "generalised" and affect the whole, or at least a great part, of the membrane; or that it may be "localised" in any one region, the latter condition being by far less fatal to life. The localised variety, again, may or may not result in the production of an abscess—a collection of matter due to the severe inflammatory process known as suppuration. Generalised or diffused peritonitis is perhaps most commonly fatal, whereas the localised variety is much less serious, but presents every grade of danger up to that of the diffused form. Broadly speaking, those cases which suppurate or form an abscess are more dangerous than those which do not.

Returning now to the alimentary canal, we find that the small intestine terminates by entering the large intestine in the region of the right groin and that it does so at a right angle to the course

of the large gut. From the point of junction the large intestine passes up the right side of the abdomen, but below the junction it forms a bag or cul-de-sac some three inches long known as the cæcum. Again, near the lower end of the cæcum, there protrudes the little structure with which we have specially to deal and which is known as the appendix or vermiform appendix. This arrangement will be rendered more intelligible by the accompanying diagram, which shows the termination of the small intestine, the commencement of the large gut, the cæcum



and the appendix in their relative positions and in about their relative sizes. It is again to be remembered that all these structures, including the appendix, are covered by folds of the peritoneum with which their walls are in structural continuity.

The *vermiform appendix* itself has a structure closely resembling that of the intestine, but it is of smaller size; its internal diameter

is usually about equal to that of a small quill; externally it is rather thinner than a lead pencil; in length it usually measures from three to six inches. At one end its cavity opens into the cæcum; at the other it is blind and rounded off. In man this structure appears to have no functional importance, and it is apparently a remnant of a portion of the alimentary canal which has become lost in the course of development. That its origin dates from an early period in the history of animal life is indicated by its presence not only in man and certain apes but also in the wombat, a marsupial standing low in the scale of the mammalia, while in some herbivorous animals it is a large and important organ of digestion.

The human alimentary canal is, unfortunately, exposed to various forms of disturbance. Irritants of many kinds produce more or less serious injuries, and gastric catarrh, indigestion, dyspepsia, intestinal catarrh, diarrhœa, and constipation are well-known conditions generally associated with at least some injury to, or inflammation of, the canal. The majority of these slight ailments rectify themselves or are readily set right; were it otherwise it is doubtful if life insurance could ever have come into existence. Deleterious substances, whether solid and mechanical or more purely chemical in their action, are swept along the wide tube; inflammatory discharges are evacuated; the ubiquitous micro-organisms pass along in the general stream. In the vermiform appendix the conditions are, however, less favourable; its tube is narrow; its opening into the cæcum is small, and is placed at a wide angle to the surface upon which it opens; current there is none—at least in the sense in which there is a current of the general intestinal contents.

Hence the appendix shares with the intestine the risks of irritation, but it is deprived of the flushing and drainage of the main canal. It is a sort of eddy in the great stream. Undigested matter, inflammatory secretions, and irritating organisms can here find a resting-place and set up a more energetic and continuous inflammation or catarrh. The changes of disease become more marked, and are indeed so common that it is stated that one-fifth of all dead bodies present evidence of some bygone mischief.

So long, however, as irritation and inflammation are confined to the lining membrane of the appendix they probably do no great harm. The structure having no part to play in the general economy, its partial disablement is but little felt, and it may be

that we have no symptoms, or at most some vague pain or discomfort.

Unfortunately, there is always a tendency for such minor inflammation to spread outwards; to pass beyond the lining or mucous membrane of the little canal, and eventually to reach its enclosing peritoneum. And now the condition is one of peritonitis; it has extended to the great general lining of the abdomen, and we have before us all the risks of general peritonitis, of suppuration, and of the other conditions to which we have already referred. It is this condition of *peritonitis arising from the vermiform appendix* which we recognise as *appendicitis;* the latter is in reality not so much an inflammation of the appendix itself as of the peritoneum which surrounds it. Such appendicular peritonitis, or, briefly, appendicitis, may be localised or diffuse, may kill quickly by invading the entire peritoneal membrane, may lead to the production of abscesses, or may manifest itself in one or other of many different ways.

Appendicitis is not a *new disease*, and it is not proved to be more common to-day than in pre-historic times, although it must be admitted that modern habits probably tend to promote those intestinal disturbances to which its origin is to be traced. All that is certainly new in the last quarter of a century is that it has been clearly recognised, thoroughly studied, more rationally treated, and precisely named. Before this time people suffered and died from "inflammation of the bowels," "peritonitis," and many other conditions which were at least as effectively fatal as if they had been called appendicitis. The new nomenclature implies no new risk, while newer methods of treatment tend to decrease the risk. Until, therefore, it can be shown that the disease is actually and not only nominally one of increasing frequency we need not let it modify our estimates of the general expectation of life.

Of the *causes* of appendicitis we know but little, and we cannot in any way anticipate or guard against it in those who have never been affected. The disease is essentially one of *adolescent* and *young adult males*, about 80 per cent. of all cases occurring before the 30th year, and the majority appearing in the male sex. Hence it may be regarded as an almost negligible risk in the proposals of those over 30 or 35 years of age, and especially in older women.

The *general health* of the proposer is of little or no importance in this connection, appendicitis appearing equally in the weakly

and in the robust. Indigestion of various forms does, however, probably predispose to its attacks by allowing of the passage towards the appendix of undigested masses of food, by permitting of accumulation and growth of parasitic organisms, and by association with inflammatory conditions of the mucous membrane which may spread to the very vulnerable appendix. In this connection *imperfect mastication*, whether due to bad teeth or to hurrying over meals, and the swallowing of fruit seeds, fragments of nuts, or other similar objects, may be regarded as highly likely to cause appendicitis.

In a small proportion of cases my own experience would lead me to suspect a *hereditary tendency* to the disease shown by its appearance in parents and children or in several members of the same family, and such a condition may well be due to slight inherited peculiarities in the size, shape, or position of the appendix; but I cannot say that the tendency is sufficiently well defined to assist in the selection of lives for insurance.

The question frequently arises whether *injury* may cause the disease, and it is sometimes put forward as demanding compensation under the Workmen's Compensation Act. Except in cases vitiated by such financial considerations, it is very rare to find any suggestion of injury as a cause, and it is not easy to see how the ordinary accidents of life would damage a structure so deeply placed, so well protected by sensitive surroundings, so yielding and so mobile as the healthy vermiform appendix. On the other hand, it is quite possible that, when this structure has undergone some previous inflammation, its damaged tissues may be seriously compromised by blows or strains and that a more virulent attack may thus be set up and may in good faith be assigned to the injury and to the injury alone. In this connection it is again important to remember that slight attacks of inflammation of the lining membrane of the appendix may produce few symptoms or none at all, and that it is only the active spread or exacerbation of the disease which gives it obvious and serious importance.

The attempt to ascertain the actual *mortality* from appendicitis is surrounded by almost insuperable difficulties, and we do not know either the frequency of the disease in relation to population or the general risks of the disease itself. The statistics of the Registrar-General are useless in the case of an affection of comparatively recent discovery and difficult of recognition. The

personal experience of consulting physicians and surgeons is obviously no index to the general distribution of a complaint of this nature. The collective experience of many men engaged in general practice, taken in conjunction with the population with which they have to deal, would be of the utmost value, but is, unfortunately, not obtainable. For these reasons I prefer not to quote any of the figures which are occasionally given and which amount to little more than guesses or to demonstrations that the mortality can be reduced by skilful treatment. This much may, however, be asserted—that in all cases, and especially in those which demand some form of surgical operation, the risk to life must be greater in remote districts and in half civilised or wholly uncivilised countries, so that for this, as well as for many other reasons, even slight digestive disturbances are to be regarded more seriously in those who will be called upon to travel beyond the aid of expert surgical assistance.

Thus far we have referred only to one aspect of appendicitis—the primary attack—but we must now turn to a question of greater practical importance—the *probabilities of recurrence*. The man who has apparently recovered from a first attack has had a localised peritonitis, and he retains a damaged appendix with a varying degree and a varying extent of inflammation, or of the scars and adhesions which result from inflammation. The local susceptibilities of the part are now greatly increased, and it may well happen that slight disturbances will relight the acute disease. Under such circumstances his life is once more jeopardised, and the fact that he has recovered from one or more attacks is no guarantee of a satisfactory ending to those which may follow, while the recurrent illnesses and disablement react disastrously on the general health.

It is for this reason and to prevent these dangers that the operation of removal of the appendix has been introduced and is now largely practised; after such removal the possibility of appendicitis is at an end, the latent danger is absolutely got rid of, and the general health is often much improved.

The most important practical question in connection with life insurance thus comes to be "What is the extra risk involved by a history of a bygone attack of appendicitis"? When we have such definite history we have a definite point from which to start, and offices can take steps to protect themselves against recurrences even if they are powerless against the primary attack.

With regard to the steps which ought to be taken we cannot give a dogmatic statement, but we can establish certain data which may be of value.

In the first place, we may clear the ground by saying that if the disease has been treated by removal of the appendix, and if the operation has been properly performed and a sound scar obtained, it leaves no permanent weakness or injury. Cases thus treated may therefore be regarded as good average lives and may be accepted at ordinary rates a few months after the operation.

Setting these cases aside we may divide all which have not had the appendix removed into two great groups—those in which the first attack caused suppuration or abscess-formation, and those in which it did not do so. In cases of suppuration, matter will generally have escaped through the skin of the right groin, and the presence of a scar will readily indicate the condition to the medical examiner. (Cases in which the abscess has perforated internally may be more difficult of recognition, but are negligible from the present point of view.)

Dealing first, then, with the cases which do suppurate, we find that, although the attack itself is more fatal, the dangers of recurrence are diminished. The formation of the abscess appears to be associated with a total or partial destruction of the appendix, which is less effective but somewhat similar in its results to the operation of removal as practised by the surgeon. The actual frequency of recurrence after suppurative appendicitis is, however, very variously stated. Treves, whose experience is enormous, says that "by the occurrence of suppuration the patient is—in all but a very small percentage of cases—cured of his trouble," and he does not consider removal of the appendix necessary in such cases. Other surgeons, however, regard the results as less favourable and estimate the dangers of recurrence at from 3 to 15 per cent. My personal experience agrees rather with that of Treves, as I have met with very few cases in which the formation, opening, and drainage of an abscess has been followed by recurrence, while of the very many cases of the disease I have met with I do not remember to have seen a single one showing the scar of old suppuration.

It is further to be noted that not only is recurrence comparatively infrequent after suppuration, but that if it does occur it almost always does so within one or at most two years. On these

grounds it appears to me safe to assume that two years after an attack of suppurative appendicitis a life may be accepted at ordinary rates provided always that there have been no symptoms in the interval.

In the second place, we have to consider the risk of cases which have recovered without suppuration, cases less serious during the attack but more liable to recurrence. Here again we cannot state precisely what the probabilities of recurrence may be, but there is a fairly general consensus of opinion that about one-half do recur. Such a ratio taken by itself would probably at once exclude all question of insurance, but again we must have regard to the duration of the interval. The longer the interval the less is the risk of recurrence, and such recurrence becomes uncommon after two years, while it may perhaps be described as rare after five years. These cases may then be accepted at ordinary rates when five years have elapsed since the attack, but within the first two years they can only be taken with a considerable addition to the premium.

There is still a third class of case which may come before us, viz., those in which the proposer has had two or more attacks. In these, recurrence has actually taken place, and the probability of further recurrence is now very greatly increased. Such cases are probably uninsurable until after the appendix has been removed. A similar view finds expression in the practice of surgery, as even the more conservative members of the profession usually advise removal of the appendix after a second attack of appendicitis. Such advice implies that many practitioners do not regard the dangers of a single attack as calling for the loss of time, expense, and trivial risk of the operation, whereas a second attack renders it, in their opinion, imperative.

Lastly, we may have to consider certain cases in which an attack of suppurative appendicitis has left some complication, such as a fistula or permanent opening into the bowel. In cases of this class insurance would not be contemplated until after the fistula has closed, when the risk probably becomes the same as that of any other attack of suppurative appendicitis.

In conclusion, then, we may sum up the various points which we have been considering somewhat as follows:—

I. The now well-recognised frequency of appendicitis does not affect the general rate of mortality.

II. The probability of a first attack cannot be foreseen or guarded against.

III. Proposers who have had an attack must be specially dealt with.

1. If the appendix has been removed by a competent surgeon insurance at ordinary rates may be effected in six months.

2. After a single attack with the formation of an abscess insurance may be effected after a two year's interval.

3. After a single attack without suppuration the risk begins to diminish rapidly after the first year or two and is negligible after five years.

4. After two or more attacks the risk is too great for insurance unless

(*a*) there has been a successful operation;

(*b*) there has been a very long interval of time.

5. An open fistula and certain other rare complications render the life uninsurable.

WILLIAM THORBURN, F.R.C.S.

Manchester Insurance Institute,
January 13, 1903.

ESSENTIAL FEATURES IN LIFE ASSURANCE ORGANISATION.

I AM deeply sensible of the honour you have conferred upon me by electing me to the Presidency of the Insurance Institute of Toronto, many of whose members are eminently better qualified than I for this important position. Relying upon the valued support of Council and Committees, by whom I have already been greatly helped and encouraged, I will endeavour to secure to the Institute during my term of office a continuation of that prosperity which has thus far attended its development—a prosperity due in no small measure to the ability and earnest efforts of my predecessors. At the least, may it be said that through my election the Institute suffered no retrogade step.

Topic of Paper. Imposed upon the newly elected President, by the unwritten law of custom, is the task of delivering an introductory address. In compliance with this law I will ask you to consider this evening as my opening address to the Institute the reading of a paper entitled "Essential Features in Life Assurance Organisation." This paper, while it may furnish suggestions and be of interest to those engaged in the several branches of Insurance, has been prepared especially for the benefit of the young men who have either taken up Life Assurance as a permanent profession or who are considering the advisability of so doing.

Scope of Paper. It has become a recognised feature of Life Assurance management in some countries—in Canada to a limited extent—to departmentalise the work, and in this paper I have endeavoured to define some of the departments which I believe every progressive Life Assurance Company should establish immediately its business warrants; the qualifications of the chief and his assistants in those departments; the duties which devolve upon them; the opportunities which exist for them; and the benefits which accrue to the Company

through their being properly qualified. Many of the references throughout the paper, while capable of general application, are intended to apply specially to Life Assurance as conducted in Canada.

The Chief Officer.

In every business or enterprise there must be someone to take the initiative, to look to for orders, to be responsible for success or failure. In Life Assurance that person is the President or Manager. He alone is responsible to his directors for the ups and downs associated with the business, and all the other employees of the Company in the office and in the field are responsible to him. In Great Britain this position is almost invariably filled by one who has been technically trained for it—the actuary. In Canada and the United States this is not so frequently the case. In order to fill the position of chief officer most efficiently in the ideal Life Assurance Office, the occupant should have had both technical training and experience.

In support of the foregoing view, I give the opinion of probably the most eminent living authority in the profession—Dr. T. B. Sprague:—

"The one conclusion which my experience has impressed on me most forcibly is that the prosperity of a Life Office depends principally on the character of its chief officer; and that, if he is unequal to his work, directors, agents, shareholders, and friends, however influential, will labour in vain to promote the permanent prosperity of the Office."

"The manager should himself be a skilled actuary, in order to discharge his duties in a thoroughly efficient manner."

"The aim of the founders of the Institute (of Actuaries)—to raise the status of the actuary—is summed up in the desire that the actuary should be the Manager of his Office. I think it is better, however, to express the same thing in a slightly different way, and to say that our desire is that the Manager of every Office shall be an Actuary."

The Chief Actuary.

As intimated, there is a sharp distinction between the position of the chief actuary in a British Office and his position in a United States Office. In Great Britain the chief actuary is invariably the principal officer, holding a position somewhat analagous to that of the president of a United States Company. In the United States the chief actuary's duties are usually confined to problems relating to his own particular technical branch

of work. In Canada the chief actuary is generally either the chief officer or the second in command. His services are usually highly regarded, not merely on account of his technical knowledge, but on account of the general information which he possesses upon all matters pertaining to Life Assurance. Our Canadian Companies will, it is believed, be all the better for following the usually sound views of the actuary—who has been described as the pilot of Life Assurance.

In the ideal Company I believe that the system in vogue in Great Britain would be preferable, and that the chief officer, who is usually designated as manager, should be a qualified actuary.

THE ACTUARIAL DEPARTMENT.

The idea conveyed by the statement that the chief officer should be a qualified actuary does not presuppose that he should deal with all the actuarial minutiæ; on the contrary, he will organise an actuarial department, at the head of which he will have a duly qualified actuary.

The authority whom we have already quoted says:—

"When the Manager of a large Office is an Actuary, it will be impossible for him to take personal charge of the actuarial department and to supervise the calculations that are made in it. He must therefore be assisted by a competent Actuary, who will probably have the title of Assistant Actuary; and under him, again, will be a staff of skilled assistants, whose qualifications are such that they are entitled to be called Actuaries."

What Constitutes an Actuary.

The question now naturally arises, what constitutes an actuary? and again the opinion of Dr. Sprague is worthy of being quoted:—

"The rule may be distinctly laid down that an actuary is a Fellow of the Institute of Actuaries, or a Fellow of the Faculty of Actuaries in Scotland, and that no other person can properly take to himself the title."

Since the foregoing view was expressed the Actuarial Society of America has come into existence, and I should add to what Dr. Sprague has said, "A member of the Actuarial Society of America."

Mr. C. D. Higham, F.I.A., in his recent presidential address to the Institute of Actuaries, said in this connection:—

"We want no 'trade union,' nor that a man shall be prevented from computing and advising if he finds those who will trust him, but it ought not to be a grievance that the appellation in the United Kindom should, after a short interval, be exclusively reserved for the Fellows of this Institute (F.I.A.), and of the Faculty of Actuaries in Scotland (F.F.A.)."

The suggestion made by Mr. Higham will no doubt become a reality in the United Kingdom, and in time, with certain additions or modifications, extend to the Colonies. While the profession of an actuary has not as yet in the United States or Canada received that recognition that it has in Great Britain, it is steadily and surely rising in dignity and importance.

There are two actuarial bodies, holding examinations annually in this country which assist students to become actuaries—the Institute of Actuaries of Great Britain, incorporated by Royal Charter 1884, and founded in 1848, generally recognised as being the most important Institute of its character in the world, and the Actuarial Society of America, founded in 1889.

The course of study prescribed by the Institute of Actuaries of Great Britain is a most liberal one, and if a student is successful in all the four examinations he is justly entitled to the degree F.I.A. —"Fellow of the Institute of Actuaries." He receives, however, after successfully taking the first two examinations, the degree A.I.A.—"Associate of the Institute of Actuaries."

Examinations of Institute of Actuaries.

The following are the subjects of the examination:—1st.—(1) Arithmetic and Algebra.

(2) The Theory and use of Logarithms.

(3) The Elements of the Theory of Probabilities.

(4) The Elements of the Calculus of Finite Differences, including Interpolation and Summation.

2nd.—(1) Compound Interest and Annuities-Certain.

(2) The application of the Theory of Probabilities to Life Contingencies.

(3) The Theory of Annuities and Assurances on Lives and Survivorships.

(4) The principles of the construction of Mortality Tables (excluding graduation); and the construction of monetary and other Tables involving the Contingencies of Life.

(5) The elementary application of the Calculus of Finite Differences and of the Differential and Integral Calculus in Life Contingencies.

3rd.—(1) The methods of constructing and graduating Mortality, Sickness and other Tables.
(2) The history and distinctive features of existing Tables.
(3) The Valuation of the Liabilities and Assets of Life Assurance Companies.
(4) The Distribution of Surplus.
(5) The Calculation of Office Rates for Assurance, Sickness and other risks.
(6) The practical valuation of Life Interests and Reversions, and of Policies for surrender or purchase.

4th.—(1) The Elements of the Law of Real and Personal Property.
(2) The Law relating to Life Assurance Companies and Life Assurance Contracts.
(3) The Constitution and Valuation of Friendly Societies and Pension Funds, and the Laws relating to such Institutions.
(4) Life Assurance Book-keeping; preparation of Schedules, Statements and Reports.
(5) The Principles of Banking and Finance, including a knowledge of the Constitution and Operations of the Bank of England, and of the National and Local Debts of the United Kingdom.
(6) The Investments of Life Assurance Companies.

The Institute has been considerate in arranging that the examinations be held in Canada, taking place in April each year at Montreal, Ottawa, and Toronto. The same papers are prepared for all students taking the same examination. The papers for this colony are transmitted to a supervisor at the centres named, under covers which are opened in the presence of the students on the day of the examination. The sheets containing the answers are enclosed by the student in envelopes, sealed by him, and then handed back to the supervisor, who transmits all to the Institute authorities in London, England, for examination. The percentage of successful candidates for the past five years, will no doubt prove of interest to intending students:—

[TABLE.

Years.	Part I.	Part II.	Part III. Sec. A.	Part III. Sec. B.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
1902 .	65	28	44	50
1901 .	59	19	33	68
1900 .	47	33	23	30
1899 .	49	34	28	34
1898 .	55	28	46	32

Examinations of Actuarial Society of America.

The examinations of the Actuarial Society of America treat almost entirely with actuarial problems. These examinations are but two in number, and are thoroughly characteristic of the duties of the United States actuary and his scope of work. The student, if successful in the first may be enrolled as an Associate, and if he subsequently passes the second he is admitted to *membership* in the Society. The following are the subjects dealt with in the two examinations:—

Examination for enrolment as an Associate:—

(1) Arithmetic, Algebra and Plane Geometry, including the theory and use of Logarithms.

(2) The Principles of Double Entry Book-keeping; the elements of Compound Interest, including Annuities Certain.

(3) The Doctrine of Probabilities; the elements of Interpolation.

(4) The application of Mathematics to Life Contingencies, including the theory and use of Commutation Tables, the computation of Premiums for Term, Ordinary and Limited Payment Life and Endowment Policies, and also for Policies with return of premium, and the different methods of computing Reserves; all the above for single and for joint lives.

(5) Practical examples in the foregoing subjects.

(6) General nature of Life Insurance Contracts; the outlines of the history of Life Insurance, and the source and character of the principal Mortality Tables.

Examination for admission as a Member:—

(1) Methods of constructing and graduating Mortality Tables and the use of formulas of Gompertz and Makeham.

(2) Methods of loading Premiums to provide for Expenses and Contingencies.

(3) Valuation of Liabilities and Assets of Life Insurance Companies.

(4) The Assessment of Expenses and the Distribution of Surplus.

(5) Practical treatment of cases of Alteration or Surrender of Life Insurance Contracts.

(6) Application of the Calculus of Finite Differences and of the Differential and Integral Calculus to Life Contingencies.

(7) Laws of the United States and Canada relating to Life Insurance.

(8) Insurance of Under-Average Lives and Extra Premiums for Special Hazards.

The Responsibilities of the Actuary.

We have said that the head of the actuarial department should be a duly qualified actuary, and have indicated the steps usually taken nowadays to become such. There is no department in a Life Assurance organisation which requires greater technical skill, combined with good business judgment. If premium rates are faulty, if valuations are carelessly made, or sound principles relating thereto ignored; if surplus is inequitably apportioned; if surrender values have not been calculated with a due regard to actual and prospective conditions, a serious injury to the whole organisation will undoubtedly result, and for these and many other conditions the actuary must be responsible. The work which the actuary has to perform or direct deals with matter vitally essential to the well-being of the institution.

The Practical Actuary.

While he should be a good mathematician, he should also be a man of practical ideas. There is no end to the number of schemes of assurances that an actuary will be able to suggest, but many will be found quite impracticable. He should be in sympathy with the members of the field staff in order that he may the better appreciate the enquiries which they make from time to time and the competition they have to meet, thus being in a position to aid the agent, thereby adding to the Company's prestige and success. A field training of some months, or an occasional visitation among the agents, will prove invaluable to the actuary. He will get many practical and valuable suggestions from agents—for it is a well-known fact that some of the most popular forms of assurances of to-day originated with the field worker. The actuary should also be in touch with the wants of the public, for by that means he will be able to suggest forms of policies, changes in contracts, etc., which will tend to make his

company popular and progressive. He should have an accurate knowledge of all standard mortality tables, that he may be able to determine which table is the best for each separate requirement. A mortality table which might be deemed suitable for the computation of Life Assurance premiums might not do at all for the determination of annuity rates. Conditions are continually changing in Life Assurance, and the actuary should keep himself informed concerning them. As an example, the "British Offices Life Tables" have recently been made public; and it is the actuary's place to determine whether he shall recommend to his chief officer that the new tables be substituted for the old in the calculation of premiums, reserves, etc. Another example is the variation constantly taking place in interest earnings, and this latter condition is certainly one which necessitates judicious treatment.

Actuarial Assistants.

The proper training of assistants is one of the most important duties of a competent actuary. Every actuary should have under him a staff of assistants of such education and attainments as to entitle them to be called actuaries, or to enable them in due time to reach the required standard. I think it should be laid down as a principle by the actuary in charge that each member of his staff must pursue the studies necessary to qualify him as an actuary. The effect of this would be that a group of thoroughly efficient men would always be available for important and responsible positions in the Company.

The educational training which an assistant should have previous to entering an Office is a subject regarding which there are many opinions. I think it is quite safe to say that as a minimum he should have passed an examination at least as important and as comprehensive as the honour matriculation examination of, say, Toronto University. Personally I should prefer to select an assistant who had successfully taken up the first year's work or the first two years' work in Arts in a university graded about the same as Toronto University. I think that a first or second year university student will make a better and more efficient assistant than a student who has taken the full Arts course, unless the student can have entered the university sufficiently early to be still comparatively young when graduated. If somewhat advanced in age the graduate is more difficult to train, his long and severe course of study upon set

lines has a tendency to make him too theoretical, his business faculties have been undeveloped for too long a period, and the result is that it becomes more difficult for him to appreciate the practical problems with which he has to wrestle. A young man fresh from college, having matriculated as indicated, or having successfully passed his first or first and second year's examinations, should, without much reviewing, successfully write upon the first examination of the Institute of Actuaries; while his previous academic training will render the work of subsequent examinations less difficult.

Suggestions for Actuarial Assistants.

The actuary and his assistants should cultivate the habit of writing on subjects pertaining to their profession—articles for, or letters to, the Insurance journals, or "literature" for their Company. It assists the student to express himself with greater ease and freedom, gives him confidence in himself, and acts as a healthy stimulus to investigation. They should be constant and persistent readers of the transactions of all Insurance and Actuarial societies, and of certain representative Insurance periodicals.

Apart from the ordinary routine pertaining to the old business, there are many duties which the actuary and his assistants will be called upon to perform—the calculation of new premium rates, of rates for special policies, of policy values, of annuity rates and values, of surrender values, of the expected loss, etc., etc. Original investigations and tests will be instituted from time to time. Investigations of the rate of mortality according to place, occupation, mode of life, or race, will be frequently undertaken by the actuary. The proper, equitable, and best way to determine how distinctions arising out of these different conditions should be made is a problem which is constantly demanding solution.

The actuary and his assistants should always be alert to the requirements of the public. The placing before the public of a new plan of Assurance having merit, or of an old plan dressed in a new garb, will sometimes assist in attracting additional new business, stimulate the agency staff, and tend to make the Company more popular and progressive. Assistants especially should be encouraged by their chief to undertake work of this character, and they themselves should be sufficiently interested in their profession and in their particular Office to make original suggestions.

Changes are constantly being made in the policy contract of Assurance, the modern tendency being to make the policy simple and more liberal in its terms. The more simple and attractive, consistent, of course, with safety to the Office, the more easily will it be interpreted, and the more will it commend itself to those seeking insurance. The actuary's training and studies should cultivate in him the use of concise, direct, and simple language; such being the case, he should be able to assist in remodelling the policy forms of the Company as required. The Company's "canvassing literature" also affords a wide avenue for the capabilities of the members of the actuarial staff. The aim of each member should be how he can best forward his Company's interests, and in the efforts to do this he will effectively forward his own. Every effort made strengthens him to more efficient performance of his next duty, gives him added experience, enables his chief to rely more implicitly upon him, and thus brings to him added responsibilities, more important duties and sure promotion, with corresponding increase in emolument.

Field for Actuary's Assistants.

The field for actuarial workers is limited. Our largest Companies have a staff of not more than nine, while in many Offices three or four assistants will be the maximum. Those who contemplate embarking upon the actuarial profession may find it somewhat difficult to get a position in the actuarial department of a Life Office on account of the limited staff required and the limited number of Companies in Canada, although for our population the number is far beyond what it should be. It is not necessary for the staff of an actuarial department to increase so rapidly as the staffs in the other departments of a progressive Office. If a young man is fortunate in being properly located in a well organised and efficiently conducted actuarial department of a progressive Life Assurance Company, and he displays an aptitude for the theoretical and practical development of the work, he is bound to rise.

THE MEDICAL DEPARTMENT.

The chief medical referee, as head of the medical department, in the determination of those lives which are safely assurable, performs one of the most important duties involved in Life Assurance economics.

Care in Selection of Lives. The careful selection of lives lies at the threshold of successful Life Assurance. Let there be laxity in this one feature, and all must suffer—policy holders, shareholders, officers, and agents. On the other hand, if conspicuous care is displayed it is at once evidenced in the yearly accountings, which are always analysed and criticised by friends and foes. Mr. J. W. Alexander, President of the Equitable Life Assurance Society of the United States, in a recent address, referring to the selection of risks, said:—

"This side of the management of a Life Insurance Company is of the first importance. . . . A half million dollars in the death claims for one year in one of the largest Companies may be saved by the application of wisely directed attention with far greater ease than one hundred thousand dollars can be saved in expenses."

Local Medical Examiners. It cannot be supposed that the ordinary local medical examiner will have much more than a layman's knowledge of Life Assurance, but it is essential that the chief of the medical department shall have a clear comprehension of the underlying principles. In some Companies the local medical examiner is not even asked whether he recommends the applicant for assurance. All that is required of him is to make the personal examination as called for by the blank, and obtain by inquiry information from the applicant, according to questions proposed, concerning his personal and family history. The medical referee then determines the eligibility of the life. In most of the medical reports, however, the local examiner is asked whether he considers the life safely assurable on the system proposed, and whether he regards the applicant as a first, second, or third class life. The misconception which local examiners have of the various systems of assurance has no doubt influenced some Companies not to seek their recommendations, but, instead, to form an independent opinion of the life, based on the answers to questions proposed.

Advantage of Actuarial Knowledge to Medical Referee. If Companies were to adopt the old principle of rejecting all lives which do not come up to a certain necessarily high standard, a comparatively small knowledge of Life Assurance on the part of the medical referee would suffice, but to-day some of the best Companies here, in Great Britain and in the United States, accept lives which require

some special modification in the system of assurance, in the amount of assurance, or in the premium, and it is particularly in dealing with this gradually increasing class that the medical referee would find his work much more intelligible, and himself much more confident if he possessed actuarial knowledge. The following are cases where some modification, as referred to above, would become necessary:—

(*a*) Where the hazard diminishes with age, as in the case of a young man whose family history is tainted with phthisis.
(*b*) Where the hazard increases with age, as in the case of a young man a member of whose family has died of apoplexy, gout, etc., diseases which usually threaten life only after middle age.
(*c*) Where the hazard is permanent throughout life, as in the case of a person following a dangerous occupation.

Treatment of Imperfect Lives by Medical Referee and Actuary.

At the present time, when a life is below the normal, the actuary is generally consulted by the medical referee, in order to find out what method should be adopted, if the life is to be accepted at all, to compensate the Company for its imperfections. The medical referee indicates to the actuary the extent of these imperfections and their likely effect upon the life of the applicant. The actuary determines the money value of the defects, and how best that money value can be secured, whether by increasing the normal premium, shortening the term of the assurance, or making the assurance in the early years small, and gradually increasing it from year to year until a maximum is reached. It will thus be seen that united action of the medical referee and the actuary becomes indispensable. But the same results could be reached if the medical referee were himself an actuary, and in a much more satisfactory manner, for it is difficult for the actuary to get the nice point of view of a case that the chief medical officer has from a careful study and analysis of the subject in the light of his professional medical knowledge, and at the same time it is difficult for the medical referee to realise the exact effect of the proposed modification suggested by the actuary, and whether it is the best in the particular case. It would therefore appear that the ideal medical referee should have actuarial knowledge, as with this knowledge he would bring to bear in the discharge of his duties a more intelligent, a more skilful, and a more just judgment. In this connec-

tion, however, I am not insensible to the benefit to be derived from the two independent judgments, although I believe the opinion of a thoroughly grounded actuarial-physician, able to view the case from all points, would be better than the combined judgment of a physician and an actuary who have to explain to each other their respective standpoints, when it must be expected that some of the impressions which have been mentally noted cannot be conveyed by language.

The Life Table. Such an officer will have a just appreciation of the life table upon which premiums for whole life assurance are based, and will not fall into the error which has misled more than one medical referee of assuming that because an applicant in his judgment "is good enough for age 70," the risk is a first-class one. A knowledge of the construction of the Institute of Actuaries (Hm) life table would indicate to him that the last surviving life assured dies after age 98, and that each individual life assured on the whole life system should have the prospect of reaching that age. The usual course for a medical referee to follow in dealing with a risk is, after a full consideration of the facts in hand, to ask himself the question, "To what approximate limit of life will the applicant attain?" After settling this question, he adjusts the system of assurance, the premium, or the sum assured accordingly. Without actuarial knowledge, or actuarial advice, this would be impossible.

Knowledge of Systems of Assurance Indispensable. Unless the medical referee has an accurate knowledge of the many systems of Assurance he is placed at a serious disadvantage. The following actual cases will serve as illustrations:—

1. An applicant applied for a whole life assurance, with mortuary additions for 20 years, of 50 per cent. of each gross annual premium. The risk was accepted subject to a lien running off gradually in 20 years. The fact that the system provided for a gradually increasing risk for 20 years was not appreciated; if it had been, the mortuary addition feature would have been eliminated.

2. An applicant applied for a "20 year pure endowment" form of policy. The agent, through oversight, had the applicant examined. The family history was defective. The medical referee reported the risk declined. Had he known that the poorer the life the more acceptable was such a risk to the Company for this form of policy, he would not have fallen into this error.

3. An applicant applied for a 1,000 dol. contract, which combined the elements of Endowment Assurance and Annuity; the financial effect of which was that the reserve under the contract

at the end of 15 years was greater than 1,000 dols. The life did not exhibit signs of vitality beyond a period of 15 years. The medical referee recommended the acceptance of the risk on the 15 year endowment assurance system, not realising that the system applied for was more favourable to the Company than the suggested modified one.

Occupations.

The question of occupation also is one which would be dealt with more strongly by a medical referee if he were grounded in the theory of life contingencies. Certain occupations are beneficial to health and longevity; others, again, are detrimental to health, and tend to shorten life. By this it is not to be inferred that there should be a special rate for each distinct occupation. Those occupations having mortality rates closely approximating may be considered under one broad head, but in those cases in which the mortality is materially greater than the average, it becomes necessary to charge an extra premium. For example, it is a well-established fact that those engaged in the liquor business are subject to a mortality very materially greater than that of the general population. The reports of the Registrar-General of births, marriages, and deaths in England show that the excess amounts to no less than 50 per cent., and the Scottish Amicable's experience proved that liquor-sellers assured in that Office had a mortality more than 50 per cent. greater than that of its other members. Practically the same condition was found to exist when analysing the experiences of the Standard Life, the Law Life, the Life Association of Scotland, and the North British and Mercantile Life.

There would appear to be no one more able to determine the probable effect of occupation upon the individual life than a physician, and while ordinarily he would not be fully acquainted with the true extent of the increased risk of any particular hazardous class, yet if he possessed actuarial as well as medical skill he would be able to determine the money value of the extra mortality involved.

Illustrations are not lacking where the medical referee and the actuary, working jointly, have produced most valuable contributions to medical Life Assurance.

Medico-Actuarial Investigations.

In 1888 Dr. A. H. Smee and T. G. Ackland, F.IA., chief medical officer and actuary, respectively, of the Gresham Life Assurance Society, published their first edition, and in 1890 their second edition of a treatise "On the Assurance of Lives Liable to

Service in Military and Naval Operations at Home and Abroad." This work has been received with marked favour by the profession.

H. W. Manly, F.IA., actuary, Equitable Life Assurance Society (England), and Dr. F. Glover Lyon, one of the medical officers of the same society, each contributed a paper on Consumption at a meeting of the Institute of Actuaries in February, 1892. Mr. Manly's paper was entitled "An attempt to measure the extra risk arising from a consumptive family history when the life proposed for assurance is physically sound and healthy," and Dr. Lyon took for his subject, "Remarks on consumption in relation to life assurance."

Medical and actuarial science worked together in a most efficient and practical manner when it produced that invaluable guide in the selection of risks, "Medical Hand-book of Life Assurance," the joint production of Dr. Jos. E. Pollock and Jas. Chisholm, F.I.A., F.F.A., physician and actuary of the Imperial Life, England.

Another publication which clearly bears the impress of the joint labours of the actuary and the physician is "Causes of death among the assured in the Scottish Widows' Fund Life Assurance Society, 1874–1894." This work is well worthy the perusal of all students of Life Assurance, and forms a most valuable contribution to the science. Claud Muirhead, M.D., F.R.C.P.E., medical officer of the society, the author, says in the preface concerning certain elaborate tables:—"These tables have been prepared by Mr. Turnbull (F.F.A., F.I.A.) and his assistants in the actuarial department of the Office, but more immediately under the superintendence of Philip C. M'Kean, F.F.A., to whom I am largely indebted for liberal assistance and valuable advice in the preparation of this report."

Analysis of Life Assurance Statistics.

Dr. Leslie Ogilvie, B.Sc., M.B., Ed., M.R.C.P., Londón, says:—"The medical analysis of the statistics of Life Insurance Companies is a matter of great difficulty; but I have often thought that the most valuable information on the subject of Life Assurance is actually buried in the safes of the Companies." If our medical referees and their assistants had a comprehensive grasp of the theory of Life Assurance and the elements of statistics it would not be long before the mine of wealth which Dr. Ogilvie refers to would be giving forth its treasures. But the fact is that, comparatively speaking, very little use is made of this

material, and principally, I believe, because the actuary has not sufficient medical skill to deal with it, nor the physician sufficient actuarial knowledge to enable him to reduce it to a useful practical basis. Dr. Ogilvie adds in the same paper:—"Might not both professions (medical and actuarial) be even more closely associated than at present, in a constant endeavour to increase by every available means our statistical knowledge?"

Along the same lines, Mr. Geo. M. Low, F.I.A., F.F.A., F.R.S.E., says:—

"What would be of the greatest service in the business of Life Assurance would be an enquiry of the kind illustrated in Mr. Manly's paper, but conducted on a basis sufficiently wide to give thoroughly reliable data, and embracing not one branch of enquiry only, but all those groups and classes of cases presenting extra risk which most ordinarily occur in practice. It seems highly probable that the results would modify various current views and theories—would show that in the general practice of Offices some points receive too great importance, and would bring into prominence others that at present are too much overlooked. However that might be, there can be no doubt as to the value that would attach to reliable statistics showing even approximately for different classes of under-average risks, what extra rate of mortality is really involved. There is plenty of material in the Offices for such an enquiry. It has frequently been suggested, and, although as yet the idea has not advanced beyond the stage of suggestion, it may be hoped that some day the Offices will awaken to its importance, and that the inquiry will be undertaken on a sufficiently wide and comprehensive basis. It will be a work of great labour, and it will call for the joint exercise of medical and actuarial skill—the medical to group appropriately the various special features in personal and family history to be dealt with, and to refer individual cases to their proper groups, and the actuarial to tabulate the results and bring them into a form suitable for practical use."

Mr. R. D. Miller, F.F.A., in his very interesting paper, entitled "A Confession of Faith," read before the Insurance Institute of New South Wales in July, 1902, said:—

"In passing, I would like to say that there are many phases in our business in which either the physician or actuary alone is utterly useless; but when they join their forces we have a powerful combination capable of solving many a knotty problem."

Medical Assistants.

As we have actuarial assistants to perform the detail work of the actuarial department, so we must have medical assistants to assist the medical referee in the medical department. It is also essential that an assistant in this department should be

specially qualified for the position, and to say that he should be possessed of both medical and actuarial skill is surely not setting too high a standard.

Some Details of Medical Department.

The medical department, to one who takes a broad, business-like, and scientific interest in his work, is one of the most interesting in Life Assurance practice. Almost every day enquiries are made to other Offices relative to unfavourable action taken by them upon applications. Most absurd replies have been received, indicating on the part of the one answering the enquiry (be he officer or clerk) entire ignorance of what he was recording. If the enquiry were answered by a medical-actuary assistant, these absurdities would not occur, the Office giving the information would be saved from ridicule, and the Office receiving it would obtain satisfaction. It not infrequently happens that the defects of an applicant, and the reasons why an extra premium, a modified system of assurance, or a lien is proposed, have to be explained in order to secure the applicant's consent to the suggested modification. The medical-actuary, or his assistant, will be the best equipped person to do this. In the details associated with the appointment of medical examiners, such as enquiring into their credentials, etc., the assistant in the medical department who has medical knowledge and a just appreciation of the qualities which a medical examiner should possess will be able to perform the work intelligently. In the investigation and examination of death claims actuarial and medical knowledge are almost always essential, and the person having this duty in hand should be equipped accordingly. The correspondence conducted by the medical department with the Company's medical examiners and agents will be all the more satisfactory if the officer or his assistant has not only medical knowledge, but also assurance knowledge.

Medico-Assurance Experience Desirable.

Medico-assurance experience will assist materially in the intelligent and efficient keeping of the records of the medical department. It is most important that the cause of death be accurately noted, for future reference and for statistical purposes. Unless this is done the experiences which may be taken out will be faulty and unreliable.

An instance where the possession of medical knowledge by the assistants in the medical department was important, was the

furnishing recently of data by the various companies to the Actuarial Society of America for the purpose of bringing out the specialised mortality table. It was not to be expected that the medical referee could go over the great mass of material from which the desired information was to be extracted, requiring months of close application, and it could hardly be delegated to clerks having absolutely no medical knowledge. No doubt in some Offices the work was placed in the hands of such clerks, in which event it cannot but be inferred that the desired facts were not recorded. The new method which has been adopted by the United States Life Companies, and by some Canadian Life Companies, of reporting defective risks, calls for more than mere clerical work—if this work is to be done accurately and thoroughly it must be performed by a person possessing medical knowledge.

There are many other duties which might be referred to requiring medical training, but sufficient has been said to indicate that our Companies should see that their medical departments are equipped with young men who are training themselves scientifically for the technical work in which they are engaged, and it behoves the young men in the medical departments of our companies, and those who desire to become learners in this branch of Life Assurance, to make the best of their opportunity to acquire accurate actuarial and medical knowledge.

THE ACCOUNTANCY DEPARTMENT.

Chief Accountant.

The model Office will, of course, have a strong accountancy department, and in this branch of Life Assurance there is ample scope for originality to men of capability and clear conception. I do not think the proposition will be questioned that the chief accountant should not only be a practical accountant but that he should thoroughly understand the underlying principles of accountancy. In this province we have an Institute of Chartered Accountants, and it would appear that the chief accountant of a Life Assurance Company, with Head Office in this province, should have demonstrated his fitness for the position either by having successfully passed all of its examinations, or in some other satisfactory way. Moreover, it should be the aim of every clerk in the accountancy department to qualify himself for the examina-

tions of this body, and thus be in a position to secure promotion when his time arrives.

Should Accountant be an Actuary?

Should the chief accountant of a Life Assurance Company be an actuary? There are many instances of this actually being the case, and it may be safely assumed that the trained accountant who has passed, say, two examinations of the Institute of Actuaries, or the first examination of the Faculty of Actuaries, or the first examination of the Actuarial Society of America, will be able to perform his duties in a stronger, broader, and more efficient manner. I do not think that it is suggesting too high a standard to say that the assistants in the accountancy department should prepare themselves for these examinations.

Benefit of Examination and Study.

The examinations can be taken up gradually, and will undoubtedly not only benefit the assistant and the Office, but will prove a most interesting and valuable study, and possibly lay the groundwork for more important studies in some of the other institutes. The training which a young man receives by systematic study, and the strength and self reliance which come to him, by virtue of having to dig and delve along the line of a particular branch of knowledge, are invaluable. If successful, as almost every young man will be if he be honest with himself in his study, it creates enthusiasm for his profession, gives him a greater interest in it, and enables him to render better service to his Office.

Life Assurance Accountancy.

The work of accountancy in Life Assurance is not always accorded the status which it rightly deserves. From a knowledge of the system in vogue in some Offices I do not wonder that office work in them is uninteresting and dull—in fact, it may be said to be stale and unprofitable. The alert, bright, and up-to-date Life Assurance accountant will tell you that there is a constant change going on in the treatment of office details, and that he welcomes any innovation which is calculated to reduce labour, to facilitate the conduct of the work, and to make it more efficient. Mr. R. P. Hardy, F.I.A., said in this connection :—" To frame a scheme of books and forms that were at once analytical and interlocking, presenting at the same time the maximum of convenience for the needs of to-day, encumbered by the mere minimum of what was

indispensable for the emergency wants of the future, was in itself a liberal and highly stimulating education."

Improvement in System.

The chief of an Office should encourage his assistants to present any new method which they believe has merit. There is no Office which has now or ever will have a perfect system, but it should be the aim of every Office to improve its system, to introduce more effective checks, and a more perfect interlocking of the records one with another. Briefly, it may be said that:—

1. The system should be analytical.
2. The system should be interlocking.
3. The system should be convenient and require a minimum of labour.
4. The system should be a checking one.
5. The system should give accurate information.
6. The system should be adapted to the requirements of the Government returns.

Mr. A. D. Lindsay Turnbull, A.I.A., F.F.A., says along these lines:—

"As every Office, or nearly every Office, is increasing its business at a very rapid rate, and as the public is more and more feeling the necessity for Life Assurance, a decided effort should be made by all to still further simplify, if possible, the practice of book-keeping."

Obejcts to be Attained by Life Assurance Book-keeping.

Mr. John J. McLaughlin, F.F.A., says:— "In considering the subject it is necessary to keep steadily in view the objects to be attained by Life Assurance Book-keeping. These are:—

"(1) To afford ready information as to the financial transactions of the Office with every individual with whom it does business, providing in the case of persons with whom there are continuous business transactions, and periodical settlements, a regular acount;

"(2) To record fully the intromissions of the officials with the funds of the Office;

"(3) To classify the various transactions of the Office so as to produce at the end of the year (*a*) a revenue account and (*b*) a balance sheet, in the forms prescribed by the Life Assurance Companies Act, 1870, with such further details in the case of each as it may be desired to place on record."

Mr. Turnbull in his paper adds two others:—

"(4) To enable the Directors, or at least the Manager, to know, with full particulars, the total cost of New Business and the expense of carrying on Old Business.

"(5) To enable the Company's Auditor, without inconvenience to his staff or that of the Office, to make a thorough audit in a reasonable time, and besides, the system should be such that the clerks will not be apt to make mistakes, and, when an error has been made, they should be in a position to readily notice and quickly locate it."

If the company is doing business outside of Canada, as for example in the United States or Great Britain, the system should lend itself to producing conveniently the statements required by the country in which the Office is transacting business.

Points to be Kept in Mind.

The following, among other points, have been suggested as being important for the accountant and his assistants to bear in mind :—

(1) To determine the uses and object of each book, and the circumstances under which the information recorded will be required.

(2) A thorough acquaintance with the underlying principles involved in the particular set of books used in the Office.

(3) How these principles can be best applied to the new conditions.

(4) The effect of the discontinuance of one or more books.

(5) The introduction of better books or methods in order to obtain the desired results, keeping well in mind that it is important to preserve an easily accessible record of each transaction, and to combine the results of all the transactions.

(6) The importance of reconciling one year's receipts with those of the preceding year, and analysing and accounting for the difference.

(7) An analysis of the accounts of his own Office, as well as those of other Offices, as disclosed in Government returns.

Habit of Independent Thought.

In connection with the foregoing the following remarks are appropriate :—

"To those who wish to qualify themselves for promotion to positions of responsibility, that they cannot begin too early to cultivate habits of independent thought —first of all to enquire the reason for every precaution that they find is taken in business, and the reason of every rule that is laid down for their guidance, and subsequently to consider whether the present course of procedure can be in any respect improved."— Dr. T. B. Sprague.

I would also suggest that the masterly work of Dr. Sprague on "Life Insurance Accounts," be studied by every Life Assurance

accountant and assistant. Although it does not apply to Life Assurance accounts as made up under the Dominion Insurance Act, it contains many valuable suggestions and helps.

Suggestions for the Office Assistant.

In leaving this branch of work I would strongly urge upon every young man who is engaged in what may be termed general office work, to observe the following:—

(1) To improve early education by such studies as he may find himself most deficient in, and which will most assist him in his present duties.

(2) To prepare himself for some examination in accountancy—either the examinations of the Institute of the Chartered Accountants of Ontario, or other kindred societies, the object being to have some goal in view and to attain it.

(3) To continue his studies along actuarial lines, and prepare himself at least for the first two examinations of the Institute of Actuaries, the first examination of the Actuarial Society of America, or the advanced examination of the Federation of Insurance Institutes.

(4) To analyse, compare, and study the annual reports of Life Assurance Companies, as published by the Companies, and as contained in Government returns.

(5) To read carefully all criticisms and notices on Life Assurance annual reports, as contained in the Insurance and financial journals—published here, in Great Britain, in Australia, and in the United States.

(6) To critically examine the financial statements and reports of commercial and financial enterprises.

(7) To thoroughly adapt himself to the records of his own Office and always keep in view the idea of how he can improve the existing system, remembering that the intricacies of Life Assurance demand special forms of record, and consequently afford abundant scope for originality.

"Change of circumstances should be at once recognised, and every modern invention that seems likely to be of real improvement should be adopted—not perhaps immediately it is brought out, but immediately after there is good reason to think it will be an improvement."—Dr. Sprague.

INVESTMENT DEPARTMENT.

The Necessity of an Investment Department.

The model Office will have an investment department, controlled by an officer who is a specialist in finance, and who will be responsible to the chief officer of the Company. It may be advocated that the investment department of a Life Company should be under the especial care of the chief officer

of the Company. This department of a Life Company is one of the most important, for if the funds of a Company are injudiciously invested disaster will surely result, and thus it is that the investment of the funds of a Company demands such close attention, such special aptitude, that it requires the undivided attention of some one person, and this the chief officer of a model Office is unable to give.

Two Major Sources of Profit.

The two major sources of profit of an Assurance Company arise from care in the selection of lives and the interest earned on the accumulations beyond the rate of interest at which the reserves are maintained. The aggregate experience of 39 United States Companies for the year ending December 31, 1901, as reported to the State of Connecticut, showed that 48 per cent. of the total profits arose from excess of interest earned over and above that required to maintain reserves, and 37 per cent. from favourable mortality. Mr. A. H. Bailey, F.I.A., states that:—"Of the two main elements on which all Life Assurance transactions depend—the rate of mortality and the rate of interest—the latter, I think, affords more scope for the exercise of judgment and skill than the former. . . There can be no doubt that the amount of interest realised on the assets can be materially influenced by the degree of judgment and knowledge brought to bear upon the subject."

The Financial Actuary.

The training and experience of the actuary especially qualify him to deal with the investment of the Company's funds. The question as to what proportion of a Company's funds should be invested in certain classes of securities is one which can best be determined by the financial actuary. A certain minimum rate of interest, dependent upon the rate assumed in the actuarial calculation of the Office, will require to be obtained. Again, this officer should be careful to see that the time for which investments are made has some relation to the duration of the assurance contracts entered into. He should be able to advise what classes of securities are most suitable for his particular Office; and what interest yield rate should be expected, inasmuch as the rate of interest is a co-efficient in all Assurance and Annuity calculations. Of course, the final decision regarding all investments will lie with the directors, who are generally men of prudence and ability.

The selection of risks is made daily by one or more trained men, and inasmuch as the greater part of a Life Office's profits

results from the judicious investment of funds, the selection of securities should also have continuous thought and be in the hands of a thoroughly trained man having a just appreciation of the subject from a Life Assurance standpoint. In discussing the subject, "Money and the Future Rate of Interest," Mr. A. G. Smith said;—

> "In everything relating to the success of Insurance Offices, a knowledge of these values (value of money and the future rate of interest) is likewise of paramount necessity, for, however accurately your facts as to mortality are stated, however skilfully your formulæ are framed, if a mistake is made as to the value of money or rate of interest, error will be the result."

Selection of Investments.

The chief of the investment department will realise that there are certain classes of securities which are looked upon with special favour by his directors; if these are not available in sufficient amounts to utilise all the surplus funds of the Company, it will be his duty to study and investigate the qualities of other kinds of available securities. He should always be able to explain in the minutest detail every feature of an investment which he may recommend, and be prepared to answer without hesitation any question which may be proposed touching it. The faculty of marshalling expeditiously the favourable and unfavourable features in an investment proposition is one which should be cultivated in order that no time may be lost in coming to a conclusion regarding it.

Effect of a Good Rate of Interest.

It is questionable if there is any phase of Life Assurance which calls for more care and more skill than the investing and loaning of the accumulations in order to secure the maximum returns compatible with absolute safety. The maintenance of a good rate of interest is one of the indications of successful management. Mr. J. J. W. Deuchar, F.F.A., F.I.A., stated:—

> "It may serve to indicate the great importance of obtaining a good return on the investments, if it is realised that one per cent. of increased interest on the funds of a Company will, on the average, have as great an effect as a saving in expenditure equal to 10 per cent. of the premium income."

An increase in the average interest earnings of all Canadian Life Assurance Companies for the year 1901 of only one-fifth of 1 per cent. would more than meet all the dividends paid to shareholders by these Companies that year, while, if an Office could

count on realising 5 per cent. interest in place of 3, it might reduce its premiums some 30 per cent., or double its bonus.

Security of the Capital Invested.

No matter how desirable a high rate of interest may be, the first consideration in connection with the investment of funds is the absolute security of the capital invested. "Perfect security, as far as human efforts can attain to it, ought to be, and is the first of those conditions—that is, expectation of profits must be subordinated to safety." In determining the character of investments available, every Office must be guided by the powers conferred upon it by Parliament. This restriction, of course, narrows down the number of securities, and it is a debatable point whether in Canada our Parliament should not follow the British practice and give Life Assurance Companies practically unlimited powers to select their securities.

Reasons for Success of British Life Offices in Investments.

The success which the British Companies have experienced in the investment of their funds is almost proverbial; one authority states that "the history of Life Assurance business in the United Kingdom affords scarcely a single example of the failure of a Company through bad investment."

This is a remarkable statement, and one which it will be interesting to look into by endeavouring to ascertain the reasons that have made the British Life Assurance Companies so successful in this respect. The following, among others, are given :—

"1. That the investment department is under the personal management of the Board of Directors, or of a committee of them. This is advantageous, inasmuch as the judgment of several experienced persons is safer and more reliable than that of any one individual.

"2. Usually the Board of Directors is composed of persons engaged in different professions and pursuits—merchants, manufacturers, solicitors, financiers, etc.—and consequently, when any transaction is presented, at least some one director will have had experience in dealing with similar transactions.

"3. That those in charge of the investment of the funds have been men of great prudence and probity, who, before bringing any transactions before their board, have carefully investigated its merits, and are prepared to answer any questions which may be proposed. One writer says :—'Given the same high qualities in the men who are to guide and direct the investments in the future, the outlook, so far from giving any cause for anxiety, may be faced with absolute confidence.'

"4. The practically unrestricted area from which the British Companies have the right to select their securities has been a most important factor in their success. It has not only assisted to increase their interest earnings, but, as is desirable, has increased the variety of suitable securities.

"5. That a high rate of interest has always been made a secondary consideration to the perfect safety of the capital.

"6. The investments have been selected with a due regard to the character of the business of Life Assurance. Assurance Companies contract to pay money at periods more or less remote—they are not exposed, as are banks, to sudden and extraordinary demands in time of panic or commercial depression—and their requirements can be predicted with great precision. Therefore, keeping a small portion of their funds in readily-convertible securities, they are able to invest the remainder in securities that are not readily convertible."

Assistant in Investment Department.

The assistant who is placed in a favourable position to engage in the work of the investment department will find the duties interesting, intructive, and pleasant, provided he takes a deep interest in everything tending to make his work intelligible, and himself more proficient and experienced.

The first course he should pursue, by reason of his association with the finance arising out of the business of Life Assurance, is to prepare himself for at least the Associate examination of the Institute of Actuaries of Great Britain, the Faculty of Actuaries of Scotland, or the Actuarial Society of America. His preparation for the examination of one of these bodies will teach him the value of accurate knowledge, give him a good grounding in the theory of finance, make him exact in his statements, and correct in his analysis, while his standing in the profession, if successful in his examinations, is so much enhanced. He should also possess a good knowledge of book-keeping, so as to readily appreciate any financial statement coming under his attention.

Value of Actuarial Training to a Clerk in the Investment Department.

The value of actuarial training to a clerk in the investment department cannot be overestimated. When debentures are being tendered for, tables of values may not be available covering the yield rate for the transaction, or the period of time for which the debentures are to run. This training will enable him to determine the desired value accurately and confidently from first principles. When debentures are bought at a premium or at a

discount special calculations are necessary to determine the amounts which should each year be credited to principal and to interest. The assistant who is acquainted with the theory of interest and annuities-certain will be able to do this work with expedition and ease. Investments will be presented in which it is stipulated that the principal is to be repaid by equal monthly or quarterly instalments, or the interest payable monthly or quarterly. There may not be prepared tables to determine the value of such investments, and it may, therefore, become essential to construct a formula to obtain the desired information. Annuities-certain, increasing in arithmetical progression, are not infrequently offered to Life Assurance Companies for purchase or as security for a loan. Bonds payable at irregular intervals and in irregular amounts, carrying one rate of interest, and offered at a price to yield another rate, will sometimes be met with. In dealing with these cases mathematical knowledge is indispensable. Mr. Geo. King, F.I.A., at the conclusion of Chapter IV. of his "Theory of Finance," says that circumstances may render it necessary to modify the many formulas which he has set down, and that it may frequently happen that there is no formula given in his work which will directly meet the case in hand; but he goes on to say that the principles enunciated will remain constant, and the actuary who has fully mastered the principles will find no difficulty in adapting the formulas to special conditions. While life interests and reversions are not offered to Canadian Life Assurance Companies for purchase or loan by any means as frequently as to Companies in Great Britain, the investment department will have presented to it from time to time favourable transactions of this description, and in view of the special features entering into these purchases and loans an actuary's skill and knowledge become most desirable.

There are many other special investments in the consideration and valuation of which the one having actuarial knowledge will prove himself superior to one without this special training; and I think it can be safely maintained that the man having actuarial training is all the better qualified to deal with those investments of a Life Company which do not necessarily require actuarial knowledge, for the reason that the training of the actuary has a tendency to make him accurate in his knowledge, analytical in his investigations, far-seeing in his conclusions, and sound in his judgment.

Investments of Canadian Companies.

In connection with the investments of Canadian Life Companies, it will be interesting to note the amount of invested assets and the manner of distribution among the various classes of available securities. At the close of December, 1901, the total assets of our eighteen Offices amounted to 66,141,980 dols. The amount and proportion of the funds of all the Companies invested in each separate class is given in the following Table:—

	Amount.	Percentage.
Real estate	$ 5,128,108	7·7
Loans on real estate	19,059,811	28·8
Loans on collateral	3,890,222	5·9
Loans on policies, etc.	6,437,563	9·7
Stocks, bonds, and debentures	27,037,804	40·9
Cash	1,080,051	1·6
Agents' balances	56,479	·1
Interest and rents due and accrued	1,003,250	1·5
Outstanding premiums	2,284,862	3·5
Other assets	163,830	·3
	$66,141,980	100·0

Distribution of Investments.

In an analysis of the assets of the individual Canadian Companies some most remarkable differences will be revealed. The question may very well be asked, Why has one company deemed it proper to have 25 per cent. of its assets in real estate, while others have a much smaller proportion? Why has one Office 74 per cent. of its assets in loans on real estate, while another has but 16 per cent.? And again, Why does one Company maintain 51 per cent. of its assets in stocks, bonds, and debentures, while another has but 6 per cent.? Upon investigation it may be found that there are very good reasons for these variations, and there is probably no one who is better able to determine what the requirements of a Company are as to the proportion of its funds that should be kept in long term investments, short term investments, or liquid securities than the actuary who has made a most careful investigation of his Company's business. Mr. D. Deuchar, F.I.A., F.F.A., has made an interesting reference in this connection:—

"The prospective demands on the funds of a Life Assurance Company for death claims, and even for surrenders, can be calcu-

lated with considerable accuracy; and, in the case of a progressive Office, where the average age of the assured is under 50, and where a fair proportion of new business is done, it may be reckoned that for the next twenty, twenty-five or thirty years, or perhaps longer, the income from premiums and interest will exceed the amount of claims and expenses, and thus that there will be no impropriety in tying up a considerable proportion of the funds for long periods."

Rate of Interest on Funds Invested.

Again, the trained actuarial investment man will be the better able to determine the rates of interest which the Office should endeavour to have its funds yield. This, of course, will be, to some extent, dependent upon the prevailing rate of interest and the class of securities invested in. But the valuation rate, or the rate of interest at which the Office calculates the reserves under its contracts of assurance and annuity, etc., should be an influential factor. An Office which is maintaining the bulk of its reserves upon a 4½ per cent. basis will endeavour to invest its funds at a rate higher than 4½ per cent., and consequently may take securities in which another Office maintaining its reserves upon a 3 per cent. or 3½ per cent. interest rate would not care to invest. It will thus be seen that the basis upon which the actuary calculates his reserves influences the rate of interest which the investment department will endeavour to have the assets of the Company earn. The following Table, giving the average rate of interest earned on the assets of Canadian companies for 1901, and the rate of interest at which reserves are maintained will, no doubt, prove interesting :—

[TABLE.

Company.	Average Rate of Interest earned in 1901.	Interest Basis of Reserves.	
		*Old Assurance.	*New Assurance.
	Per cent.	*Per cent.*	*Per cent.*
1	4·64	3·5	3
2	4·57	4·5 and 3·5	3
3	4·29	4·5	4·5
4	1·77	3·5	3·5
5	5·02	4	4
6	5·36	4·5	4·5
7	4·97	4·5 and 4	3·5 and 3
8	6·43	4	4
9	4·26	3·5	3·5
10	5·39	3·5	3·5
11	5·60	4	4
12	4·78	4·5	4·5
13	4·92	4	4
14	3·39	3·5	3·5
15	4·61	4·5 and 4	3·5
16	4·11	4·5	4·5
17	3·91	4·5	4·5
18	5·12	4·5	3·5

* "Old Assurance" refers to policies issued prior to January 1st, 1900; "New Assurance" to policies written subsequent to that date.

Suggestions for Those Interested in the Investment Department.

I will conclude my remarks under this heading by making some suggestions which may assist the young men who are interested in the investment branch of a Life Assurance Company, and who may desire to make themselves valuable to their Office:—

1. The examinations of one of the actuarial bodies previously referred to should be taken.
2. At least one of the important financial journals of Canada, of Great Britain, and of the United States should be regularly and carefully read.
3. The investment powers of all Canadian Life Assurance Companies should be studied, and the investments authorised by the charter of the Company with which he is connected, as well as those authorised by the General Insurance Act as amended, should be thoroughly familiar to the student.
4. The Government reports, which set out in much detail the

investments of Life Assurance Companies, should be investigated to ascertain the investments being made by the different Companies.

5. The financial statements of all the institutions in which his Company has money invested should be carefully examined from period to period to determine the desirability of retaining, adding to, or selling these securities. The statements of those institutions in whose securities the Company has power to invest should be similarly examined, so that when an investment is proposed in any one of them the student will have some idea as to its desirability. This applies especially to the balance-sheets of banks, loan companies, trust companies, gas companies, street railway companies, electric light or power companies, telegraph companies, telephone companies, steam railway companies, etc.

6. The movements on the Stock Exchange of those stocks in which Life Companies can invest should be carefully followed, together with such selected news concerning the money market and the prices of securities as can be generally relied upon.

7. He should acquaint himself with the terms and conditions under which companies are promoted, and offerings of additional capital in old companies made, under which conversions in securities are proposed, and bonds and debentures tendered.

8. Ascertain, from year to year, what proportion of the different Life Assurance Companies' funds is invested in the different classes of securities, and endeavour to determine the reasons which influence the Companies in investing as they do. Analyse the average rate of interest earned on the funds.

9. Endeavour to obtain accurate knowledge of land and property values. This will be difficult, and the student will never get through adding to his information along these lines. Study carefully the reports of appraisers, endeavour to cultivate the acquaintance of professional valuators, go out with them when making inspections, and endeavour to ascertain their reasons for placing the values which they do upon the property under consideration. Conditions in different localities should be studied as opportunity offers.

10. A knowledge of the elements of the law of contracts and of real and personal property will be helpful.

11. Opportunities for making satisfactory investments from the standpoint of both security and interest should always be recognised and attention called to them, and in this connection it is well to remember the six cardinal canons which have been laid down (the first five of them by Mr. A. H. Bailey, F.I.A.) for the investment of Life Assurance funds :—

(i.) The primary necessity of securing the safety of the capital.

(ii.) That the highest practicable rate of interest consistent with such security should be obtained.

(iii.) That the smaller proportion of the funds be held in readily convertible securities to provide for current demands.

(iv.) That the larger proportion may safely be invested in securities not readily convertible.
(v.) That as far as practicable the capital should be employed to aid the Life Assurance business.
(vi.) That the investments be characterised by variety.

12. A careful review of every investment of the Company at least once a year will prove most instructive, and keep the assistant in close actual touch with each security. If a loan be in arrears, prompt action has invariably proved to be the wisest course. A dilatory policy in dealing with borrowers has frequently prejudiced a Company's position, and increased its holdings of foreclosed properties. In connection with properties which have fallen into a company's hands through foreclosures, one institution at least, to my knowledge, has made it a practice to dispose of the holdings at the earliest possible opportunity, even at a loss when compared with the original principal advanced and accumulation of arrears. This policy, which the institution believes has been unquestionably the wisest and best, has been followed by it for many years.

13. The average rate of interest earned on each class of a Life Assurance Company's investments should be worked out each year. Some important and far-reaching results may accrue from this investigation, and some practical and useful information be obtained.

THE LEGAL DEPARTMENT.

It is quite significant that many of the chief officers of Life Assurance Companies in the United States have either been lawyers or have had a legal training. Life Assurance involves so many interests, has so many different phases, and is so constantly changing that it presents an interesting field for those who have had a professional and business education.

Necesssity for a Legal Department.

While all our Life Assurance Companies must of necessity have their firm of solicitors, I do not know of more than one Office (possibly two) equipped with a legal department, with a professional barrister and solicitor as its chief. It is to be wondered that such is the case, in view of the constant service which such a department might render to the Company. It may be objected that many of the duties which I may class as properly belonging to the legal department should be left in the hands of the solicitor of the Company, but can we not say, with Mr. Thomas Marr, F.I.A., "it is all very well to say that solicitors should guide you, but it would never do, and would indeed be impracticable, to refer every question to a solicitor."

Along the line of what Mr. Marr has said, Mr. A. R. Barrand, F.I.A., says :—

"The time has gone by, if indeed it ever existed, when the ordinary legal incidents arising in connection with Life Assurance business were submitted to the Company's solicitors for advice and direction." He goes on to say that "it would be impossible, in practice, to submit every question as to title, in the case of claims and surrenders, to a solicitor on account of the expense and delay thereby occasioned," and further that it would be impracticable "to saddle the applicant with such legal expenses as might be incurred."

Those in Legal Departments Should Have Actuarial Knowledge.

As in some of the other departments of a Life Assurance Office, the chief and the assistants of the legal department should acquire intimate knowledge of the theory of Life Assurance, and as already pointed out this can best be done by following the course of study prescribed by one of the several actuarial bodies which have undertaken, by lectures and examinations, the important work of Life Assurance education.

What service could a legal department render?

Some Duties of the Legal Department.

1. The application form and policy contract are constantly requiring revision in the light of new conditions and recent legal decisions. New forms of policy contracts are required for new plans of assurance. Here the technical skill of the solicitor, combined with his practical Life Assurance knowledge, will be utilised. Less than two years ago application for life assurance was made at the same time and by the same person in two Companies. Notes were given for the first premium in each case. The notes were not paid, and death ensued some months after their maturity. There was a provision in each contract that upon non-payment of a note when due the policy ceased to be in force. In one Company's contract, however, this provision was faulty, and, in consequence, the Company was compelled to pay the full amount less the outstanding note. The contract of the other Company was drawn up correctly, and although suit was threatened it was never proceeded with, and the Company thus saved 1000 dols. from an unjust claim.

2. In view of the comparatively large amounts involved in connection with claims arising under policies by way of deaths, maturity of endowments, etc., it becomes most essential that a valid and effective discharge be obtained. It will be within the recollection of all that one of our Offices was compelled to pay a policy claim twice, through failure to pay it in the first instance to the persons legally entitled to receive it. The Office acted on

its supposed legal knowledge instead of consulting its solicitors. Had it had an inside legal department it is almost certain that it would have been saved this double liability.

3. Every Office receives almost daily assignments and notices of assignments of its policies of assurance, and while it is the custom, when acknowledging such, to disclaim any responsibility for the validity or effect thereof, or to make any comment thereon, experience has proved that it is better, in the long run at least, to call attention to any palpable mistake. If this is not done the purpose intended might be defeated, or serious difficulty rendered to the parties in interest, and possibly at some subsequent period to the Company. A Life Assurance Company is dependent upon the public for support, and the more thoroughly it studies the interests of its clients, and the more free it is from legal entanglements, whether as plaintiff or defendant, the more popular will that Company become. The treatment of assignments is one which properly belongs to the legal department.

4. Almost each one of the seven provinces has distinctive Assurance laws, a condition which a Company has to regard in the conduct of its business in these different provinces. Their statutes are being constantly amended and repealed, and these changes no Company can afford to ignore or treat with indifference. It is almost impossible for the chief officer to give due attention to matters of this nature, which a well organised legal department would be in a much better position to handle.

5. While the title to property owned by or mortgaged to the Company is passed and certified to by the Company's regular firm of solicitors, it has been found profitable and desirable to have a competent person check over their work. In fact, there are many features in connection with the Company's investments which can be best attended to by a solicitor such as should be at the head of a legal department.

6. There are often very nice legal points to be determined in connection with the surrender of policies for cash, or for paid-up assurance, and in regard to loans upon policies. Sometimes cash surrender values and loans are applied for which a Company has not power to grant, for the reason that the Assured has designated as payee one who is unable to give a sufficient discharge or transfer.

7. There are always arising important matters relating to the provisions of the policy contract—modifications to meet special cases, permits, special clauses to cover unusual risks, such as the engaging in certain hazardous occupations, or the residing in parts prohibited by the terms of the policy. It is important that these be dealt with in a way to preserve the Company's rights. Those trained in law acquire a great proficiency in all matters pertaining to contract rights, and it would appear that the inside solicitor would be invaluable in this connection.

8. In these days of expansion several of our native Companies have already branched out into other fields. Inasmuch as each country has its own special Assurance laws or ordinances, it is essential for the Company, when entering a new field, to become familiar with the terms upon which business may be prosecuted therein, the obligations imposed upon the Companies, as well as the rights of the Assured and the beneficiary.

9. The question of taxation on life assurance is becoming a serious and trying one, and will undoubtedly at no distant date demand the united attention of the Life Assurance Companies. Here is a subject which a solicitor having a technical knowledge of Life Assurance should be able to handle intelligently and thoroughly. The Life Assurance Companies in their endeavours to have wrong rectified, and improper proposed legislation subverted, have felt that their hands would have been very materially strengthened if they had been able to obtain a strong legal man with a thorough knowledge of the theory and practice of Life Assurance. Such not being available, the chief officers themselves have been compelled to deal with the difficulty.

10. The investigation of doubtful claims, and the assisting of the Company's regular solicitor in the working up of cases in which the Company is involved as plaintiff or defendant, is another illustration of where the person having legal-actuarial knowledge would become invaluable to a Company.

11. The framing of important resolutions or bye-laws frequently requires both actuarial and legal Life Assurance knowledge.

12. Life Offices are constantly called upon to replace policies which have been lost. The issuing of duplicates or copies is one which requires more than the ordinary consideration; and the course to be pursued when the life fails, under such circumstances, calls for great care and caution. Cases have arisen where a policy has been declared lost, a duplicate issued, and at a subsequent period the original has turned up in the hands of an assignee.

13. If the chief and staff of the legal department have actuarial knowledge, they will be able to deal most effectively with amalgations, re-insurances, and reorganisations. While there have not been many such in Canada, they are bound to come, and the Company that is best equipped to treat with them from a strong business standpoint will be the Company that will have the opportunities to do so.

14. It would also be the place of the legal department of a Life Assurance Company to be constantly watching Life Assurance legislation, with the object of endeavouring to influence in every way possible all legislation that will have a beneficial effect upon the business. In this connection Life Assurance officials both here and in Great Britain have heretofore rendered material benefit to the Assured, to the State, and to Life Assurance generally.

Company's Regular Solicitors Indispensable.

Sufficient has been said to indicate how intimately law is associated with Life Assurance, and how essential it is that a Life Assurance Company should have a legal department with a duly qualified efficient lawyer at its head well versed in the theory and practice of Life Assurance. At the same time let it be distinctly understood that we advocate no interference by such department with those important and essential legal duties which alone can and should be performed by the Company's solicitors. All questions of title to property, opinions as to the validity of issue of bonds, debentures, etc., suits, etc., and many other of the important matters which are constantly arising, should always be passed over to the Company's solicitors.

Legal Department Valuable in Making Company Popular.

Not only for the purpose of properly safeguarding the affairs of the Office is it desirable that a legal department should be instituted in every Life Assurance organisation, but it is desirable, I believe, simply from the standpoint of the valuable assistance rendered in promoting new business, and in making the company popular—an important consideration in these days of keen rivalry and competition. Trivial legal questions are constantly arising about which the Office would ordinarily advise policy holders to consult their solicitors. Take the case of a man holding policies in two different Companies, and being desirous of effecting a reapportionment of the benefits in both contracts. If one Office took up the matter and disposed of it promptly and effectively itself, while the other indicated that it would be essential for the policy holder to consult his lawyer, thus causing him delay and expense, it does not require much consideration to determine the attitude the policy holder would entertain towards the respective Companies. It will also be realised that a satisfied policy holder is a constant advertisement for his Company, while a dissatisfied one can often nullify the efforts of an agent.

Qualifications of Assistants in Legal Departments.

The qualifications of the chief of the legal department of a Company have already been referred to. But what about the assistants? It must be realised that it is impossible for a young man to secure a full actuarial training such as is required to obtain the degree of F.I.A., and also to qualify as a solicitor; at the same time, every assistant

should realise the advisability of preparing himself for the highest position in his department. If he does not attain it in his own Office he may have the opportunity in some other Office. It appears to me that each assistant in this department should first aim at qualifying for the Associate degree of the Institute of Actuaries, or Faculty of Actuaries, or Actuarial Society of America. After securing this degree he should then take up the study of law, which he could do and still retain his position in the Office as an articled clerk to the solicitor, who would be the chief of the department. The acquisition of his Associate degree, and the completion of his law course, should qualify him, all other conditions being satisfactory, for the very responsible position of chief of the legal department. It may be, however, that some will be content with the Actuarial degree, and acquire as best they can the principles of law. This class of assistant may no doubt prove valuable. Mr. J. J. W. Deuchar, F.F.A., F.I.A., refers to this feature as follows:—"While much legal information may be acquired within a Life Office (particularly if it has a distinct Law department) by a careful and assiduous use of all one's opportunities, no Glasgow student of Life Assurance should rest satisfied with this, but should take advantage of the very excellent Law classes afforded by our University. The convenient, though somewhat early, hour of these classes (8 to 9 a.m.) places them within the reach of all Assurance clerks."

Agency Department.

There are other branches of the work of Life Assurance which might be dealt with, but this paper has extended far beyond what was intended. The agency department—one of the most important in the whole organisation—is one which has immense possibilities for young men.

Advertising Department.

Then there is the advertising and "literature" department, affording abundant scope for originality and good judgment—a department which every Canadian Company could afford to maintain with great profit and advantage.

Junior Department.

Even the juniors of the Office could be organised into a department, and thereby rendered more efficient, while such junior department would serve as a preparatory school for the training of assistants for the higher departments. The following quotation concerning the junior is appropriate:—

"A junior, although employed in the drudgery of office work, can find that post sometimes most interesting.

"His earliest duties will be the filing away and copying of letters. Here he can get a most valuable insight to the business he has chosen—for he should not be content with simply performing the mechanical work, but he should thoroughly grasp the contents. Not only will this be valuable from the standpoint of becoming acquainted with the various styles of composition, but he becomes of immediate assistance to his superior by being able to give the information which the letter contains.

"That Company is indeed fortunate whose employees from the highest to the lowest regard its interests as if they were their own, and who are encouraged to do so."

Advantage of Departmentalisation.

An objection may be raised by some that the departmentalising of the work of a moderately-sized Life Assurance Company, as suggested, would entail undue expense. To this I would answer that experience has demonstrated over and over again that the business that is properly systematised and efficiently conducted in every detail, is the business that has done best for those in interest. It can be affirmed that a Life Company so organised will make and save in its investment department alone many times the salaries and other expenses attendant upon the conduct of that department.

It may also be objected that many of the duties which have been assigned herein to the heads of the different departments should be dealt with by the chief officer of the Company. Although it may be admitted that all the departments should be governed to a certain extent by the chief officer, yet no one department should be so dependent upon him that it requires extraordinary oversight on his part. Should it not be his aim to organise his Office so thoroughly and efficiently that he will be relieved of practically all details, in order that he may be afforded sufficient freedom to superintend the Company's entire operations?

In every part of Life Assurance work the one important thing for the officers and their assistants to realise is the advantage of technical assurance education; and, if I may venture the opinion, I do not think this can be too forcibly impressed upon the staff by the chief officers and the heads of departments, nor can it be taken hold off at too early an age by the juniors.

Technical Assurance Education.

Technical Assurance education is the essential to success in these days of severe competition; our business conditions demand it, the discerning public are quick to appreciate it, and are not slow to notice the lack of it; our business associates take notice of it, and give preference to those who possess it; moreover, the great trust reposed in us is worthy of any sacrifice we may make to secure it. The system of technical education which has been in vogue in the Institute of Actuaries of Great Britain, the Faculty of Actuaries of Scotland, the Actuarial Society of America, etc., has been, without doubt, the great factor in making for sound Life Assurance.

All Officers Should be Actuaries.

The Life Company that lays down the principle that the chief of each one of its various departments should be a thoroughly-trained Life Assurance man will have the strongest, best equipped, and most intelligent corps of officers. In each department of a Life Assurance Company the officer at its head would be a man infinitely better fitted for dealing with all its workings if he had passed the examinations of one of the actuarial bodies heretofore referred to; and I would therefore lay it down as a most desirable feature that all the officers should be actuaries, and, further, that it should be the aim of the Office to develop young men in its actuarial department, that they may occupy the important positions in the Company.

In one Office alone in England there are at least twenty-five Fellows and Associates of the Institute of Actuaries holding responsible positions, and in several of them there are as many as twelve, ten, nine, eight, etc.

The following statement of Mr. John Graham, President of the Insurance and Actuarial Society, Glasgow, not only applies to Great Britain, the country to which he refers, but also most forcibly to this continent:—

"How important, then, is technical training and a thorough knowledge of actuarial science here; for in the majority of instances where disaster has overtaken Life Companies, it has been not so much through fraud, but in consequence of sheer incapacity on the part of those in charge."

T. BRADSHAW, F.I.A.

Insurance Institute of Toronto,
November 14, 1902.

CANADA AS A FIELD FOR LIFE INSURANCE.

ALTHOUGH the scope of this subject is a broad one, I have endeavoured, in order to be brief, to classify my statements under separate headings, namely:—

Development of the Business.
Laws affecting Life Insurance.
The Insurance Act of Canada.
Provincial and Municipal Taxation.
Population.
Climate.
Medical Examiners and the Selection of Risks.
Mortality Experience.
Banks and Banking Facilities.
Investments and Interest Rates.
Railway, Mineral, and Agricultural Development.
Cost of New Business.
Supply and Demand.

I have avoided the use of technical evidence, and have confined myself to a general statement of facts obtained from official records and from a personal knowledge and experience of the business of Life Insurance in Canada within the last thirty years.

The facts contained in this paper are no doubt quite well understood by the members of this Institute and others engaged in Life Insurance in Canada. I may therefore be permitted to explain, as a reason for its appearance, that it has been prepared at the invitation of the Federation of Insurance Institutes of Great Britain and Ireland as a contribution by the Insurance Institute of Montreal to the Journal of the Federation of Institutes. I trust that the members of the British Institutes interested in Life Iusurance, who may not have a personal knowledge of the conditions effecting Life Insurance in Canada, may be hereby enabled to form some opinion of

"Canada as a Field for Life Insurance."

Life Insurance, by the nature of its obligations, is essentially an institution of permanence, and any conclusions based on a limited experience would be of little value in considering the question, "Is Canada a desirable field." Hence the development of the business under past conditions, the results obtained, and the conditions now existent, must all be considered, The collective experience of the Companies that have been operating gives information which admits of an interesting comparison of the expansion of the business, and to obtain such I have had recourse to the returns made to the Canadian Government, dating back from 1869, and embodied in the first volume of Government Reports, issued in 1875, which includes the business from 1869 up to 1875, and the latest volume, issued in 1902, showing the results at the end of thirty-three years.

Development of the Business.

Before referring to the conditions and influences affecting Life Insurance in Canada, I will take up the relative proportions of the business in 1901 as compared with 1869. It is noticeable that in the year 1875, which is the first year the Government Report was issued in volume form, there were 36 Life Insurance Companies actively competing for business. In 1901 there were only 35 licensed.

In 1869 the 24 Companies operating issued new Insurance, amounting to	$12,854,000
The Insurance in force amounted to	35,680,000
The Premiums collected in cash amounted to ..	1,238,000
The Payments to Policyholders were	315,018

The business in that year was transacted by

14 British Companies,
9 United States Companies, and
1 Canadian Company.

In 1901 the 35 Companies operating issued new Insurance, amounting to	$73,899,000
The Insurance in force amounted to	463,760,000
The Premiums collected in cash amounted to ..	15,189,000
The Payments to Policyholders were	8,993,124

The business in that year was transacted by

7 British Companies,
9 United States Companies, and
19 Canadian Companies.

Although the number of Companies competing has not materially changed since 1869, there have been changes in the nationalities of the Companies. The numbers given include all the Companies licensed by the Government to transact new business and operating at both dates. The requirements in 1869 were somewhat different from those of 1901 under which a Company could seek for new business. In 1869 a number of the British Companies had Life Departments, in addition to their Fire Business, that have since ceased to write new Life business. In the year 1901 it may be said that there were only three British Companies actively competing. Within the same period several United States Companies have withdrawn from the field, while others have entered, leaving the number of active United States Companies without change. The Canadian Companies, however, have increased in number, and the introduction of industrial insurance by one of the large United States Companies within the last few years has been a factor in the volume of new business written.

The various Companies seem to have maintained throughout their national peculiarities in doing business, each admirable in its own way. The British Company, conservative and even-wayed, as usual to Britishers; the United States Company, aggressive and demonstrative, like the go-ahead citizens of the Republic; and the Canadian Company, ambitious and progressive, like the confident "come-to-stay" Canadian—each nationality accomplishing results reflecting credit on those entrusted with the administration of the business.

As the principles upon which the assessment system is based do not recognise the necessity of making undoubted provision for a definite obligation, the transactions of Assessment Insurance concerns in Canada are not taken into consideration.

The purpose of this paper being to give information to those desirous of knowing a little about Canada as a field for Life Insurance, a limited comparison of the figures showing the results obtained is, perhaps, all that is here necessary. A glance will readily convey to the mind of the experienced Life Insurance officer the conclusion that, considering the population of Canada, the business of Life Insurance Companies has not only been conducted on a large scale, but as a field for that business, barring Provincial and Municipal taxation, it is a desirable one, and gives ample opportunity for greater development, equal to that

of any other country. If due regard is had for the growth of commerce in Canada in the last thirty years as compared with the growth of the population, it will be seen that, comparatively speaking, commerce has much surpassed population. A similar position is noticeable in regard to Life Insurance. The growth of that business has largely overtaken the growth of population.

Before the yearly new business of Life Insurance can be expanded much more, Canada must increase her population by both natural increase and desirable immigration; and I venture the statement that the natural wealth of Canada can support a population equal to twice the present population of Great Britain and Ireland and Canada combined. Canada has an unlimited wealth, but has not yet the population to properly develop it.

Laws Affecting Life Insurance.

The first laws we have to consider as affecting Life Insurance Companies are those of the Government of Canada. Compliance with the Federal laws is not a hardship to Companies conducted on sound principles and properly managed, whether native or foreign Companies. The requirements and provisions of the Insurance Act protect Canadian insurers against fraudulent concerns doing business. The Companies licensed must charge adequate premiums, and invest their reserves in safe securities yielding a rate of interest sufficient to enable them to meet the obligations under their policies when they mature.

To successfully establish and operate an institution of Life Insurance, there must be both industrial and legal conditions favourable to the development and protection of its business and to its permanent existence. The laws of a country are largely responsible for the success or non-success of its financial institutions, and in no instance is this so apparent as in the case of Life Insurance Companies.

The Insurance Act of Canada.

A brief history of the establishment by the Canadian Government of the Insurance Department, for which I am indebted to Mr. Fitzgerald, Superintendent of Insurance, will be in place here as marking the period at which the business Life Insurance first came under Government supervision:—

"The first Insurance Act of Canada was passed in 1868, being chapter 48 of the Statutes of that year, assented to 27th May, 1868. This Act provided for the licensing of Companies by the Minister of Finance, the making of deposits and annual statements to the

Minister, etc., etc. The amending Act, containing three sections, was passed in 1871, being chapter 9 of the Statutes of that year, assented to 14th April, 1871. A further amending Act, containing three sections, was passed in 1874, being chapter 48 of the Statutes of that year, assented to 26th May, 1874.

"In 1875 the Act entitled 'An Act to amend and consolidate the several Acts respecting Insurance in so far as regards fire and inland marine insurers,' was passed, being chapter 20 of the Statutes of that year, assented to 8th April, 1875, was also passed —chapter 21 of the Statutes of 1875.

"Under section 23 of the first-mentioned Act of 1875, chapter 20, the Superintendent of Insurance was appointed, and the Department established. Professor Cherriman's appointment dated from the 1st of July, 1875, and he appears to have entered at once upon the duties of his office.

"By chapter 42 of the Statutes of 1877, assented to 20th April, 1877, an Act known as the 'Consolidated Insurance Act, 1877,' was passed. The next Act was chapter 49 of the Statutes of 1886, respecting Assessment Life Insurance Companies. In 1886 the previous Acts were consolidated by chapter 45 of the Statutes of that year, being chapter 24 of the revised Statutes. This last-mentioned Act, known as the 'Insurance Act,' has been since amended by chapter 28 of the Statutes of 1888; chapter 20 of the Statutes of 1894; chapter 20 of the Statutes of 1895; and chapter 13 of the Statutes of 1889."

The Insurance Act provides for special requirements from Life Companies incorporated elsewhere than in Canada in the shape of a deposit of 100,000 dollars with the Receiver-General before a license is granted. They must also deposit with the Receiver-General or trustees securities to equal the reserves on their business in force, the market value of such statutory deposit and securities to be not less than the reserves required by the Government tables of mortality and interest. A Company may, however, employ its own tables in determining its reserve liability so long as it is not less than that called for by the Government tables.

Such were the Legislative enactments of the Federal Government which created the Department of Insurance, which now regulates the enormous volume of Insurance in force on the lives of people in Canada.

Provincial and Municipal Taxation.

The laws of some of the provinces affecting Life Insurance are, I regret to say, detrimental to the development of the business and adverse to the interests of both Companies and policyholders. The chief object of the Provincial Legislatures in passing laws affecting Life Insurance Companies seems to be for taxation only. A Canadian Company may be chartered by the Dominion Parliament, or a British or United States Company may conform to all the requirements of the Insurance Act, and be licensed by the Superintendent of Insurance to do business, but as soon as an office is opened for business, or an agent appointed in a district, the company becomes an object of taxation. Municipal Corporations receive from their Provincial Governments the powers by which they tax Insurance Companies. The Provincial Governments not only tax the Companies, but pass full powers on to Municipal Corporations. Taxation is imposed without any regard to the relations between Companies and their policyholders, and both Provincial Governments and Municipal Corporations refuse to recognise the fact that Life Companies are only the custodians of their policyholders' savings held in trust. Why should savings deposited with a Life Insurance Company be taxed when savings deposited in a bank are free from taxation? The trust in one case is the same as in the other. All this is a serious drawback to the development of the business in many parts of Canada, and particularly in the earlier years of the operations of a Company.

An important mistake affecting the business of Life Insurance was made in the framing of the British North America Act, under which the several provinces became confederated into the Dominion of Canada. Had Life Insurance Companies been then placed under the control of the Federal Government, as was banking, the Companies would now be doing business absolutely under the laws of the Dominion. That oversight at the commencement has ever since rendered the Dominion Government powerless to interfere with the Provinces and Municipal Corporations in taxing the premiums received by the Companies for the purpose of revenue. So much attention has been given by the Provincial Governments to devising reasons for taxing the Companies that it has become a serious consideration, particularly to Companies first entering the Canadian field for business, and until their revenue has reached large proportions.

It may be asked, Why has not some effort been made by the Insurance interests to prevent the imposition of such exorbitant taxation? The answer is: Organised and determined efforts have been continuously made, not only by the Canadian Life Insurance Officers' Association, but by the Canadian Fire Underwriters' Association, in the interest of the Fire Companies, which, it appears, receive similar treatment; and also by representatives of other Insurance interests outside of these two organisations, to convince these legislative bodies that such taxation is unjust and a burden imposed upon an individual class, whose thrift alone makes them the object of this imposition, but without accomplishing any satisfactory result. The efforts put forth may, however, have somewhat lessened the evil as compared with what it might have been, and may possibly have saved the Companies from being entirely deprived of the margins of profits to their policyholders. The single difference, therefore, between the two powers that legislate, namely the Dominion Parliament and the Provincial Legislatures, is that the former encourage the building up of Life Insurance as a protection for the people, while the latter sap the very substance from which that protection is created.

Population.

Next, perhaps, to the laws of a country as affecting the business of Life Insurance is its population. The laws of a country are evidence of the measure of the intelligence of its rulers. Where the laws are wisely framed and the people rule through organised government, the population must necessarily be intelligent, hence I have given the laws which affect Life Insurance interests first consideration.

The present population of Canada, excluding Indians, being in the majority descendants of the French, English, Irish and Scotch people, can be fairly classed as the production of the fittest, not the survival. The mingling of these nationalities by marriage has produced a race of Canadians which is, mentally and physically, inferior to none. Canadians are a moral living and industrious people in a marked degree. Intemperance is limited, although a large portion of the country has only recently been opened up to immigration, and a portion of the population being new, requires a certain period of residence to become impressed with the new and perhaps (in some instances) changed conditions. Being a northern country, the climate conditions may perhaps admit of a freer use of alcoholic beverages than more southern

latitudes do, but even then the objectionable effects are not apparent in a degree that would reflect on the good habits of the people and be detrimental to longevity.

The population of Canada, which, in 1871, included only four provinces, was 3,695,000. In the year 1901 it had reached 5,371,000, being an apparent increase of 45 per cent. If allowance, however, is made for the decrease in the Indian population, the actual increase will be nearer 55 per cent. While the growth of population has only been moderately rapid, it has been of that class most desirable for the development and the peopling of a great country such as Canada is destined to be. For many years yet the majority of the population will undoubtedly be engaged in agriculture and associate occupations; such is even now the case with a very large proportion of the population, due to the rapid development of our cereal-growing lands. It is not an over-estimate to predict that within fifteen years the population of Canada will have reached ten millions of people, and of that number two-thirds will be engaged in agricultural pursuits. The capabilities of the country in regard to means of subsistence for population are almost unlimited, and the estimate that I have made of the number of people that Canada can provide homes for and take the best care of is a reasonable one; in fact, I think I am much under the mark.

The figures I have given show that, although the growth of population only advanced about 55 per cent. since the Companies first reported their business to the Insurance Department, the increase in new business written in 1901 over 1869 was about 600 per cent.; of insurance in force, about 1,200 per cent.; and of annual premiums paid, about 1,250 per cent. These increases of Life Insurance business may be due, in a large degree, to the enterprise of the Companies and the more general acceptance of Life Insurance by the people, but in the main it must be due to the greater average wealth of the people and their ability to pay for Life Insurance now as compared with the earlier years.

Climate.

Canada is favoured with one of the finest climates of any country in the world. Its variety is enhanced by the great geographical area of the country, extending from the Atlantic Ocean on the east to the Pacific Ocean on the west, over 3700 miles; and from the United States boundary on the south to the unlimited regions of the

north, which, in certain longitudes, is a very great distance. At no season of the year does it in any part lack the invigorating qualities so desirable for the development of a strong and healthy people. It does, however, lack the enervating effects produced by the sluggish and warmer conditions of the south.

The most fastidious weather seeker can find in many parts of Canada localities agreeable to his tastes and temperaments in any of the seasons of the year. An unjust impression of our climate has been obtained abroad through the indiscreet publication in past years of graphic illustrations of ice carnivals. It has taken a long time—if it has yet been accomplished—for the libellous impressions produced in this manner to become neutralised. Such serious enjoyments as winter carnivals and short periods of residence in an Ice Palace did at one time contribute to our pleasure, but they have had their day, and Canadians now wonder why such an innocent pastime was so glowingly advertised to the world as one of the permanent institutions of the country, available at all places in Canada and at all seasons of the year. That manner of advertising the country was not a wise experiment. Canada has been unfairly represented in many directions, and its great advantages have not been successfully represented in the proper directions. Accounts given by some early explorers and travellers speak of unlimited stretches of snow and ice. There is a little truth in some of such statements, but these stretches of snow and ice should be located in their season and place. There is ice to be found in winter in many parts of Canada, and snow in most parts, but the ice and snow last for a comparatively short time, and both are essential to the requirements of the country, because winter is a period for rest and restoration of the vitality of the land, the snow itself being a valuable fertiliser of the soil. Were it not for these advantages in the winter season in Canada, the unlimited lumber wealth of the country could not be developed excepting at enormous cost.

Many people do not appear to know that Canada has a long season of summer with a temperature that permits the production of the finest fruits. Besides fruits of the most delicate kinds, which ripen to a perfect condition, we have varieties of apples of excellent flavour and quality that are superior to those grown in any other country in the world. Canada is specially favoured with a climate and soil for the successful production of fruit.

To those who may not like the bracing temperature of the

central and northern parts as being congenial, there is an alternative in the milder regions of the great North-West and British Columbia, where, in the former country, the ranchers keep their flocks of sheep and cattle in the open in winter without food other than the grass still growing in the fields or shelter other than the sloping hills and scattered groves of trees that grow on the banks of streams.

Medical Examinations and the Selection of Risks.

This important part of a Life Insurance Company's business depends largely upon the selection of the honest medical examiner, who is possessed of ability and practical experience. The premiums charged by the Company are based on the quality of the lives accepted being of a fitness to withstand disease and continue in existence a certain length of time. The Company depends upon the medical examiner to detect any existent disease, or the after effects of disease that may have existed, and to give a correct description and classification of the risk. In fact, he must give the Company a pen picture of the applicant. Therefore, great responsibility rests on the shoulders of the medical examiner of a Life Insurance Company.

The necessity of the public being protected against the imposition of unqualified persons practising as physicians, and of the medical profession being protected against the existence of incompetent medical institutions, has, to a degree, been acknowledged by our provincial legislators, although it is a question if the laws in this respect are as perfect as they should be. This protection, so far as it goes, has had the effect of encouraging our regularly established universities to elevate the standard of medical education to a level equal to that of the profession in any country in the world. As a result Life Companies can obtain at nearly every important point the services of honest and capable medical examiners practising under diplomas granted by the medical faculties of our leading universities, and upon whom they can fully rely to protect their interests. Exception may be taken to this statement in certain cases of individual examiners, but such exceptions prove the rule.

Mortality Experience.

The mortality experience of Life Insurance Companies in Canada has been exceedingly favourable. The Canada Life, the oldest Canadian Company, and the one referred to in this paper as doing business in 1869, published its mortality

experience in the year 1893, which showed a very favourable death rate, proving conclusively the superior longevity of the Canadian people. This is the only Canadian Company that has so far published its mortality experience. In 1901 the death rate experienced collectively by the twenty-six active Companies (British, United States, and Canadian) was 11·8 per thousand of insurance in force. When it is considered that this included policies over fifty years in existence, and that the volume of insurance exposed to risk was not disproportionately increased by the accession of an abnormal amount of new business in recent years, the rate is favourable, and goes to prove that Canada is a desirable field for Life Insurance.

Banks and Banking Facilities.

While Life Insurance Companies and Banking Institutions are, in a degree, competitors for the savings of the people, they are both indirectly interested in each other's success. The conditions under which the one succeeds ensure a certain measure of success to the other. A glance at the business of Canadian banks in 1901, as compared with 1868, will not be uninteresting here:—

In 1868 the paid-up capital was	$30,507,447
And in 1901	67,035,615
To the latter figures are to be added the Reserves created since 1868	36,249,145

making over 103,000,000 dols. of paid-up capital and reserves owned by banks in 1901 as against only 27 per cent. of that amount in the year 1868.

The circulation of Canadian Banks in 1868 was a little over	$ 9,000,000
While in 1901 it had increased to over	50,000,000

Another measure of the business transacted by Canadian banks may be seen from the Clearing House records of eight cities, which in the year 1902 exceeded 2,537,228,483 dols.

The banking system of Canada is undoubtedly one of the most perfectly constructed and best conducted of any country in the world, and while being conservative in a marked degree, and eminently safe, it is sufficiently elastic to control with remarkable evenness and regularity the supply and demand of money

throughout the entire Dominion. This is effected through a system of branches, by which the banks conduct their business even at great distances from their head offices, and are kept constantly informed by competent managers or agents at such branches of the conditions of local trade and credit and the demand for money.

The legislative control of banks being under the Parliament of Canada, charters are granted by that body only, and all regulations and requirements emanate from the same power. One of these regulations I would refer to in particular as an important safeguard to the public is the limitation of the note circulation of each bank, which, in all cases, must not exceed the existing paid-up capital. The legal note circulation of the bank is guaranteed by the "Bank Circulation and Redemption Fund," which is created by the different banks contributing unitedly in the proportion of 5 per cent. of the note circulation of each, and which is held in trust by the Government, so that in case of the failure of a bank this fund becomes immediately available for the purpose of redeeming the notes in circulation.

At December 31, 1902, there were 34 Canadian banks doing business in Canada, with over 700 branches established at the most important points throughout the Provinces of Ontario, Quebec, Manitoba, British Columbia, New Brunswick, Nova Scotia, Prince Edward Island, and the North West Territories of Saskatchewan, Alberta and Assiniboia. The business transacted by many of these branches, in volume and influence, equals the business transacted by many individual banks in countries where the head or one-office system of conducting the business is the rule.

Investments and Interest Rates.

Without the aid of interest, a Life Insurance Company would require to receive premiums equal to the sums insured, therefore Life Companies fixing their premiums on the basis of contributions from interest must have due consideration for investments that will yield a sufficient rate to ensure their obligations being honoured at maturity. As the security surrounding the investment is of equal importance in Canada as elsewhere, the rate of interest is largely regulated by the certainty of the earning power that determines the level of value. The grade of the investment or its value is regulated by the certainty of the employment of the principal. In the earlier charters

granted to Life Companies in Canada the limitation of investments was very broad, but in recent years the charters granted have not contained powers to the same extent, the Government retaining the right of determining the securities a Life Company may invest in, under the Insurance Act. Such restrictions, however, do not affect the charters granted to the earlier Canadian Companies or Foreign Companies operating in Canada.

The average rate of interest earned by Life Companies on their investments in Canada in the year 1901 was 4·34 per cent. This includes all classes of securities in which the Companies made investments, the rate varying from 6 per cent. on loans on policies to 3½ per cent. on Government bonds. With but few exceptions the securities offered for public investment by established corporations and municipalities are, comparatively speaking, of a high order, even although a large portion of the country, and many of its great industries, are yet only in a stage of early development, and values are but a fraction of what they must ultimately reach. Canada offers exceptional opportunities for the investment of Life Insurance Companies' funds on good security at a paying rate of interest.

Cost of New Business.

Having briefly considered a few of the conditions which affect Life Insurance in Canada, I will now refer briefly to the cost of new business. It is well known to every responsible officer of a Life Insurance Company that too high a cost is being paid for new business, and that this condition has been brought about by excessive competition and the attendant evil of rebating. It will be out of place for me to hint at whose door the fault lies, and it is not my purpose to do so. As a first step towards a remedy, may I ask what Company is willing to go back to first principles and pay for new business only the loading on the premium and nothing more? A smaller business would be secured, but although smaller it would yield more profit to the Company than under the present high pressure methods. It is a fact that the cost of new business in Canada at the present time is three times greater for the first year of assurance than the loading on the annual premium provides. This is the result of the excessive energy for business, and cannot be healthful. Lack of persistence in the business which is secured by over-pressure throws too great a proportion of the cost on the business that is continued; besides, a depreciation in the value of selection takes

effect much earlier under high pressure business than under business that has not been forced, and which has some persistence, and under which such adverse selection does not take place so early.

A baneful element which is responsible for much of the early lapsing of policies, and the consequent loss to both Companies and policyholders is the individual in the business, sometimes bearing the respectable title of agent or broker, sometimes connected with a reputable Company—often to the Company's discredit. His work, however, is better understood under the title of "Twister," as representative of his methods. He is the villain of the business. You cannot recognise him by his dress or manners; often he looks respectable. You will hear him discuss religion, morals, and politics; he will even exhort at prayer meetings and preach in the meeting house on Sunday; but on Monday he turns his coat and resumes his disreputable occupation. He is an evil attachment to the business. His occupation is deceiving policyholders, and inducing them to change from one Company to another, and always to the one he is then representing.

Railway, Mineral and Agricultural Development.

I would briefly refer here to the development of our railway, mineral, and agricultural interests by comparison of their extent in 1901 with certain earlier dates. In 1867 there were 2087 miles of railway in operation, while in 1901 there were 18,324 miles, with an extensive construction now under way by the Canadian Northern, which, when completed, will have connections extending across the continent. The Grand Trunk Pacific Railway are also projecting a line to parallel the Canadian Pacific and the Canadian Northern Railways, also with connections across the continent, which is expected to be completed within the next five or six years. The earnings of Canadian railroads have wonderfully increased in the last few years, which is a consequent result of the great increase in the productions of the country. Canada is rapidly becoming well supplied with railway facilities.

The mineral wealth of Canada has now reached enormous values. In 1889 the output of non-metallic minerals was valued at 10,762,614 dols. In 1901 the value reached 26,582,333 dols. The metallic minerals produced in 1889 were worth 3,251,299 dols., while in 1901 their value for that year reached the enormous amount of 42,824,698 dols.

In considering the agricultural products, I shall refer only to cereals. In 1871 Canada produced 75,447,572 bushels, and in 1901, 286,699,313, or close on an increase of 400 per cent. While these figures show extraordinary development of the natural wealth of the country, it is believed by those fully competent to judge that they give but a limited conception of what the country is capable of producing.

Supply and Demand. Under this heading, I wish to refer to a condition I have not yet touched upon, which is the danger of overcrowding the field with Companies. While the general conditions at the present time are undoubtedly favourable to Life Insurance business, notwithstanding such drawbacks as taxation, ill-advised methods in competition, and unnecessary cost of the new business, the danger of overcrowding the field with Companies is serious. Like other kinds of business, supply and demand is a factor in the making of profit. Even now it is a debatable question if there are not too many Companies in the field. There has been a strong tendency in the last year or two, in certain quarters, in favour of launching more new Companies. It must be plain that with nineteen Canadian Companies, four British, and nine United States Companies now actively competing, there cannot be room for any more to do a profitable business. For the successful organisation and launching of additional new Companies there is a scarcity of executive material and directors to choose from that are not already connected with active Companies. It would be wise if a reasonable lapse of time were insisted upon before any more charters were granted.

In conclusion, I would express my opinion that Canada is a good field for Life Insurance, believing that as we advance the difficulties which now exist will not be aggravated or increased, and that new conditions, as they develop, will be so harmonised with the great interests of the business as to be a benefit to both Companies and policyholders. Canada is a desirable field for Life Insurance, not only because conditions for a safe and profitable business are favourable, but because the country has a great future before it—in wealth, population, and desirable conditions of living. Its climate is adapted to the development of a hardy race, endowed, mentally and physically, with intelligence, persistence, and abundant force. Under such conditions, there is no reason why the Companies that are now in Canada should not continue to obtain a satisfactory and profitable business.

I wish to acknowledge the kindness of Mr. William Fitzgerald, Superintendent of Insurance, and Mr. Geo. Johnson, F.S.S., Statistician, Department of Agriculture, Ottawa, for data placed at my disposal.

DAVID BURKE, A.I.A., F.S.S.

Insurance Institute of Montreal,
January 29, 1903.

ASSIGNMENTS OF POLICIES OF LIFE ASSURANCE.

Introduction. In venturing to submit to you some notes which I have made on this subject, I may preface my remarks by stating that I appear before you with no small amount of diffidence, and with considerable hesitation. For in addition to my shortcomings as an essayist, for which I crave your indulgence—the subject generally, owing to conflicting legal decisions, is difficult of treatment, and while there is an abundance of case law, there are still many questions untouched by a judicial utterance, and around which the *nox atra* of doubt prevails.

But, if we must approach some points with an open mind and a wary judgment, we shall, on the other hand, find that a careful study of the text-books and law reports shall furnish us with such a sufficiency of principles and variety of examples as will enable us to deal with the less complicated dealings which present themselves in the every-day routine of a Life Office, and it is the humble endeavour of this paper to lay before you some, at least, of these principles and examples.

Experience has fully convinced me that the discharge of the more important duties of an office necessitates a tolerably familiar acquaintance with the law of assignments, and it is very essential that the official should thoroughly understand the necessity for the course adopted, or the requirements insisted upon, before settlement of a claim, payment of a surrender, or advancement of a loan.

In what follows, no attempt is made to suggest what the law ought to be; I confine myself to the endeavour to state what the law is.

We may very properly commence our subject by a few remarks on the law generally as to assignments of *choses in action*, of

which class, I need not remind you, a Policy of Assurance is a member.

"Chose in Action."

The term *chose in action* does not lend itself readily to the understanding, and it is just possible that if we were asked to define it we might experience a little difficulty. A *chose in action* is defined in "Wharton's Law Lexicon" as "A thing of which a man has not the possession or actual enjoyment, but has a right to demand, by action or other proceeding. It is rather *in potentia* than *in esse* as a debt bond," &c. Recollecting that a policy, meaning thereby the moneys assured, is a thing of which a man has not the possession or actual enjoyment, we find the definition very aptly applies.

Assignability of "Choses in Action." At Common Law.

Under the Common Law *choses in action* were not, and are not now, assignable.* Sir Edward Coke, the celebrated Chief Justice of the King's Bench, in the reign of James I., states that were they so assignable their assignment would be the means of multiplying contentions and suits. A different, and far more weighty, explanation for their non-assignability is afforded by Chief Baron Pollock, who points out that it was a consequence of the legal conception of a contract as creating relations and obligations purely personal.

In Equity.

The Court of Chancery—a much later system of jurisprudence than the Common Law, and for a long period conducted on less rigid principles than the latter—refused to follow the strict view of the Common Law, and was at all times prepared to lend its aid to an assignee for valuable consideration. True to the equitable maxim of "following the law," the Lord Chancellor was quite prepared to recognise that the party in law entitled to recover the *chose in action* was the assignor, and he then proceeded to make use of him by compelling him to recover (or rather to lend his name to the action) the *chose in action*, and thereupon to hand it over to the assignee. It would, of course, be expensive for an assignee to call in the assistance of the Court of Chancery, and the difficulty occasioned by his inability to institute an action in his own name was usually surmounted by the insertion in the deed of assignment of a power of attorney enabling him to sue.

* Liversidge *v.* Broadbent, 4 H. and N., 610; and see "Anson on Contract."

Statute Law—Policies of Assurance Act.

In 1867, the Policies of Life Assurance Act* was passed, enabling any person or corporation "possessing at the time of action brought the right in equity to receive and the right to give an effectual discharge to the Assurance Company" to sue at law in his or its own name.† The only alteration in the law effected by this Act was one of procedure—the assignee was substituted for the assignor as plaintiff in an action.

Judicature Act.

Several other statutes have been passed rendering various kinds of *choses in action* assignable at law, and finally by the Judicature Act, 1873,‡ extended to Ireland in 1877,§ *all choses in action* have been made so assignable. It may be noted that, while the Policies of Life Assurance Act, 1867, refers to all assignments, absolute or by way of charge, the Judicature Act applies only to absolute assignments, and does not extend to mortgages.||

Notice of Assignment. Object and Form of.

Confining ourselves to our particular object—as the notice of the assignment is the first intimation the Company has of a dealing, we shall consider shortly: (1) its objects; (2) its form. The object of serving notice is twofold. Firstly, to perfect the title of the assignee; and, secondly, to establish an order of precedence between successive claimants. By serving notice the assignee converts the right which, independently of notice, he possessed against the assignor, into one available against the whole world. In the language of jurisprudence he substitutes a right *in rem* for a right *in personam*. That before notice the title of the assignee is imperfect may be seen from the fact that the assignor, in its absence, might, and it has actually happened,¶ surrender, or if he died his personal representatives might receive the sums payable, and their receipt would be a perfectly good discharge to the Company.** But if notice be served, no payments can be made except on behalf of the assignee, or with his consent. In Ireland the mere posting of notice which never reached the office was

* 30 and 31 Vic. c. 144.
† Sec. 1.
‡ 36 and 37 Vic. c. 66.
§ 40 and 41 Vic. c. 57.
|| Sutton's Trusts (12 Ch. D. 175).
¶ Fortescue *v.* Barnett, 2 My. and K., 36.
** Jones *v.* Gibbons, 9 Ves., 407, 410.

held sufficient.* Again, notice establishes precedency. Section 3 of Policies of Life Assurance Act, 1867, enacts that "the date on which such notice shall be received shall regulate the priority of all claims under any assignment." Thus, if A, an assured, assigned to B, and thereafter assigned to C, by serving notice before B, C would be entitled to rank before him. This was also the law before the passing of the Act of 1867.† If, however, it could be shown that the second assignee, at the date of serving notice, was aware of the charge of the first assignee, he would not be entitled to precedence.‡ Likewise, if the claimants are volunteers, *i.e.*, claiming under assignments, the considerations for which are not money, marriage, or such like, the service of notice would not appear to give precedence, and their claims would rank according to dates of assignment.§ *Qui prior est tempore potior est jure*. This is a fitting opportunity for me to remind you that although Policies of Life Assurance come within the scope of the well-known statute of 13 Eliz., c. 5, which renders a voluntary assignment of them void as against creditors (*see* page 384, Bankruptcy), they are not affected by the equally well-known statute 27 Eliz., c. 4, which only applies to land, and therefore a voluntary conveyance is not liable to be set aside by subsequent purchasers.|| As regards the form of the notice, the Policies of Life Assurance Act requires that it be in writing, and contain the date and purport of the assignment, and the Judicature Act likewise requires the notice to be in writing. On a first reading of the Act of 1867, one might be inclined to think that no notices, save those in writing, were in order, but a closer consideration would show that this was not so. The conclusion of the 3rd section is as follows:—"A payment *bonâ fide* made in respect of any policy by any Assurance Company before the date on which such (*i.e.*, written) notice shall have been received, shall be as valid against the assignee giving such notice as if this Act had not been passed." And the case of *Newman v. Newman*,¶ decided so recently as 1885, may also be cited as an authority for the statement that a notice of assignment need not be served in any particular form. In this case, a second incumbrancer, who had

* *Re* Hickey, 10 Ir. R. Eq., 117.
† Meux *v.* Bell, 1 Hare, 97; Jacob *v.* Lucas, 1 Beavan, 436.
‡ Hiern *v.* Mill, 13 Ves., 114; Potter *v.* Sanders, 6 Hare, 1.
§ Justice *v.* Wynne, 12 Ir. Ch. 289; and see note on this case in "Lewin on Trusts," page 800.
|| M'Donnell *v.* Hesilrige (16 Beavan, 346).
¶ 28 Ch. D., D., 674.

served notice in the form specified in the Act of 1867, was held not to have thereby secured precedence over a first incumbrancer who had not served notice in such form. Notice, therefore, it would appear, need not follow any particular form—it may be written or verbal, actual or constructive.*

The following are instances of what has been considered sufficient notice:—In *Ex parte Stright*,† a letter addressed to the office inquiring the surrender value, and which contained the words "I am holder of the undermentioned policies"; and the case of the *North British Co. v Halet*,‡ where verbal notice was held to be sufficient to give priority over subsequent assignees. Before leaving the doctrine of notice, I would remind you that a party supplying, even unintentionally, incorrect information to an intending assignee is personally liable for any loss which may result therefrom. §

Assignments. How Made. To effect an assignment, no particular form need be adopted—a wide latitude is allowed the assignor in his choice of a conveyance. He may convey by deed, but a letter stating that he assigns to so and so, || or a simple receipt, ¶ would appear to effectuate the transfer equally well. Nor indeed is it absolutely necessary to evidence the contract by writing, as it seems that an assignment may be made by a mere deposit of the policy.** In short, if satisfactory evidence of an assignment is forthcoming, it matters not whether evidence be contained in a deed, a letter, or words spoken. A good general definition of an assignment is afforded by Vice-Chancellor Wigram, in *Cook v. Black*, †† when he says:—"A transaction whereby the assured gives to a person lending money a right to be repaid out of the money to become due is in truth an assignment." But while any of the above methods will suffice to transfer the policy, an assignment by deed is greatly to be preferred. A deed is a more solemn instrument than a mere letter, and its preparation is usually left to those conversant with conveyancing. It is, therefore, far more likely to be in order on the important matter of stamp duty, and, if well drawn, will give the assignee, should he be a mortgagee, power to

* Prosser *v.* Rice, 28 Beavan, 68; Gale *v.* Lewis, 9 Q.B., 742.
† 2 D. and C., 314. ‡ 7 Jur. N.S., 1263.
§ Lyde *v.* Barnard, 1 M. and W., 101; Swan *v.* Phillips, 3 N. and P., 447
|| Chowne *v.* Baylis, 31 L. J. Ch., 757.
¶ Evans *v.* Protheroe, 3 De G. M. and G., 572.
** Row *v.* Dawson, 1 Ves. Sen., 331; Gurnell *v.* Gardener, 4 Giff., 626-680.
†† 1 Ha., 390.

give a receipt for the monies assured and, if need be, power to surrender. Furthermore, it will contain covenants for payment of the premiums, and for making a valid title and such like.

Can a mere Depositee Discharge?

It is very doubtful, indeed, if the mere deposit of a policy would give the depositee power to discharge the Company without the consent of the personal representatives of the assured. In fact, the cases of *Rummens v. Hare,** *Crossley v. City of Glasgow Company,*† and *Webster v. British Empire Mutual Company,* ‡ go to prove that he has no such power. In the first case, a policy was handed over as a gift, and it was decided that while the instrument itself passed there was no right to recover. In the second case, policies were deposited in security, and on action brought to compel payment without consent of the personal representatives of assured, it was held that the Company was justified in refusing to pay without the consent of the representatives. The contention in the last case was similar to that in the second, and the Judge went so far as to lay it down that, if the assignee in such a case subsequently makes good his claim, the Company will not be bound to pay any interest from the date on which the claim fell due. These cases suggest the method usually adopted to overcome defects, outside stamp duty, in a title, viz., joining the assignor or his representatives in the discharge as consenting parties to the payment to the assignee.

A Valid Assignment.

The following is an instance of what has been held to be a valid assignment:—A, having assured his life, wrote to the Company: "Please take notice that I wish to transfer my interest in the policies to B." This was held to be a valid assignment as against a subsequent assignee of the policies, who had, in addition, obtained possession of them. §

An Invalid Assignment.

On the other hand, it has been decided that an agreement to execute on request an assignment is not of itself an assignment,|| also that a letter from a depositor to a depositee, requesting him to instruct his solicitor to prepare an assignment (which was never done), was not an assignment. ¶ A study of these cases will show

* 1 Ex. Div., 169. † 4 Ch. D., 421

‡ 15 Ch. D., 169.

§ Chowne *v.* Baylis, 31 Beavan, 351.

|| Spencer *v.* Clarke, 9 Ch. D., 137.

¶ Crossley *v.* City of Glasgow, 4 Ch. D., 421.

that there is a considerable conflict of judicial opinion as to the validity of certain informal assignments, and they should be dealt with with much caution.

Classes of Assignments. Absolute.

Assignments may be divided into three classes —absolute, by way of mortgage, and in trust. In an absolute assignment the assignor conveys to the assignee "absolutely for ever." He completely divests himself of all interest—past, present, or future. The absolute assignee can always give a good discharge by himself, he can borrow on the policy, surrender it, or deal as he may think fit with the bonus.

Mortgage.

When the assignment is by way of mortgage the mortgagor does not assign away his entire interest. He may assign to A, and thereafter give B a charge, C may become a chargeant after B, he may be followed by D, and so on to the end of the chapter; and still the mortgagor has not, in the eye of the law, divested himself of all his interest. He has still got an estate, technically known as the "equity of redemption," and which really means his right to pay off all the mortgagees, and this estate he might sell, say, to ϕ. It would appear to have been usual before the passing of the Conveyancing and Law of Property Act, 1881,* to have obtained the consent of the mortgagor or his legal personal representatives (*i.e.*, his executors or administrators), before making any payments to the mortgagee, except the mortgage contained a clause empowering the mortgagee to give a receipt. But now, under Section 22 of the above Act, a mortgagee, where the mortgage is made by deed dated after 1st January 1882, is empowered to give a good discharge for all monies payable under his mortgage. In cases where the mortgage deed is dated before 1st January 1882, or where the mortgage, irrespective of date, is not created by deed, the assent of the mortgagor would probably still be asked for. Whether his assent is absolutely necessary or, more correctly, whether it could be insisted on, is, in view of *Glyn v. Locke*† and *Desborough v. Harris*‡, doubtful.

Nature of a Deed.

The distinction drawn by the Conveyancing Act between a mortgage created by deed and one not so created, coupled with the fact that the Stamp Act of 1891 has established a separate scale of stamping for assignments by deed, as distinguished from

* 44 and 45 Vic. c. 41.
† 5 Ir. Eq. R., 61.
‡ 5 De G. M. and G., 439.

assignments by other writing,* may perhaps render a few remarks on the nature of a deed not out of place. A deed is an instrument printed or in writing, and its essential characteristic lies in the presence of the *seal* affixed thereon. The party to be bound executes by signing, sealing, and delivering, though, strictly speaking, by the execution of a deed is understood the sealing and delivery only. There is some doubt as to whether it is absolutely necessary to sign a deed†, and it has been decided that the affixing of a rubber stamp‡ and writing in pencil § are sufficient signatures. The party sealing a deed does so by placing his finger on the seal affixed to the deed for that purpose, and utters the words "I deliver this as my act and deed"; thereby identifying himself with the document. He "delivers"—and thereby makes operative—the deed by handing it to the party to be benefited or to some party on his behalf. Assignments under seal are said to be Formal Assignments; all others are said to be Simple, Equitable, or Informal. Formerly creditors by deed had many advantages over simple contract creditors. The only advantage they now possess, in dealing with personal property, lies in the fact that their claim is good up to twenty years from the date of the deed, while the claim of the simple contract creditor "emerges" six years after its birth. But in dealing with Policies of Life Assurance, these time limits may be disregarded, and it is immaterial whether the assignment be under or over twenty years in existence on the date when the monies assured become payable.||

Can a Mortgagee Surrender?

The 19th Section of the Conveyancing Act of 1881 gives a mortgagee under deed a power to sell, but it is a very vexed question as to whether it confers the power of surrendering. Crawley ("Life Assurance"), basing his opinion on the decision in *Dyson v. Morris*,¶ thinks that an express power to surrender should be inserted in the mortgage deed, and I understand that many counsel are of opinion that the mortgagee cannot surrender without the consent of the mortgagor. It is not very easy to understand the reason for this subtle distinction between a sale and a surrender, except indeed it lie, as has sometimes been insisted on, in the fact that a surrender is a cancelling of the

* See "Mortgage," sec. 3.
† See "Williams on Real Property" and "Anson on Contract."
‡ Bennett *v.* Brumfitt, 3 L.R., C.P., 28.
§ Lucas *v.* James, 7 Ha., 410.
|| Haycock's Policy, 1 Ch. D., 611. ¶ 1 Hare, 422.

policy outright. But the distinction, if based on this consideration, is profitless, inasmuch as it fails to debar the mortgagee from surrendering, as, if determined to do so, all he has to do is to sell to a friendly purchaser, who thereupon, having all the powers of an absolute owner, could at once recover the surrender value from the Company. Moreover, there seems to be no valid objection to the mortgagee exercising his power of sale by selling to the Company direct in consideration of an amount equal to the surrender value. Of course, in this case, the discharge should be under seal, and should bear the proper Conveyance Duty. If the mortgagee cannot surrender the policy, *a fortiori* he cannot deal with the bonuses without the consent of the mortgagor. The consent of the mortgagor would also be necessary in connection with a loan to the mortgagee on security of policy.

Trusts.

The history of trusts is full of interest, but time will permit of only a very few remarks as to the historical aspect of the subject. Let it suffice to say that trusts were introduced into England, probably about the end of the reign of Edward III., for the devout purpose of enabling pious monks to completely annul the provisions of an Act of Parliament—the Statute of Mortmain—which prohibited lands from being given to religious houses, and the end was accomplished by transferring the lands to some person to the use of, or in trust for, the religious house. In law, the only party recognised was the party in possession, who was deemed the complete owner; but in equity, the parties for whose use or advantage this person held the estate were always protected, and the full benefits of ownership accorded them, the person in possession being regarded simply as an instrument for conveying such benefits. It may at first seem strange that the Court of Chancery should lend its aid to defeat this Act of Parliament, but the anomaly will, to a great extent, disappear when we recollect that the Chancellor of early days was always a high ecclesiastic, and naturally mindful of the welfare of his order. Numerous advantages accruing to A, for whose benefit the estate was conveyed to B, this method of Conveyance in Trust became very usual amongst all classes. Owing, however, to the refusal of the Courts of Law (as distinguished from Equity) to recognise any interest save that of the person in possession the jurisdiction fell entirely into the hands of the Chancellor, to the great jealousy of the law judges, who looked upon its exercise as an encroachment on their

functions. To abolish trusts altogether, therefore, the famous Statute of Uses was passed in the reign of Henry VIII., and the object was sought to be attained by the substitution as *legal* owner of the person enjoying the benefits in place of the party who was merely in possession. In a curious manner the object of the statute was defeated, and the Court of Chancery early regained its jurisdiction in virtue of a decision which has immortalised "Tyrrell's Case," to the effect that "a use upon a use was void." * Thus, if lands were conveyed to A, to the use of B, to the use of C, the Courts held that the use to C, being built upon the use to B, was void, and that the estate, therefore, vested in B. Here, then, was the opportunity of the Court of Chancery. Refusing to adopt the metaphysical distinction laid down in Tyrrell's case, it proclaimed itself prepared to support a use, whether limited upon a prior use or not, if the intention of the settlor be clear. Trusts, therefore, continued to flourish, and are now an important branch of our legal system. The Statute of Uses does not apply to personal property. When property is conveyed by A to B in trust for C, it is said to be settled. A is called the settlor, B is called the trustee or legal owner, C, for whose benefit B holds, is known as the *cestui que trust*, or beneficial or equitable owner, and the instrument by which the transfer is made is called the Settlement. Policies of Life Assurance are frequently settled, and this is not to be wondered at when it is borne in mind that, to those not possessed of property, they afford the only means of making an immediate settlement. Dealings with trusts, therefore, are constant in Office routine.

Trustees may Borrow on Policy.

The trustees are the only parties with whom the Office can deal, and they are entitled to receive all monies, and to give receipts therefor. If there is a fund set apart, out of which they should pay the premiums, they will be personally liable should they neglect to do so,† but if there be no funds, they may borrow from the Office sufficient to pay the premiums. ‡ It would appear that, in the absence of express provision, the trustees cannot surrender the policy or apply the bonuses to payment or reduction of premiums. § An assignment of a policy carries

* Mr. Watkins says that this decision must have surprised everyone who was not sufficiently learned to have lost his common sense.—*(Principles of Conveyancing.)*

† Marriott *v.* Kinnersley, Tamlyn, 470.

‡ Clack *v.* Holland, 19 Beavan, 262; Layton's Policy, W.N., 1873.

§ MacDonald *v.* Irvine, 8 Ch. D., 101; Parkes *v.* Bott., 9 Sim., 388.

bonuses, so that if it be intended that the trustees should deal with the bonuses during the lifetime of the assured, the settlement should contain a provision to this effect.*

Trust Estate is Joint.

Trust property is usually vested in two or more trustees, and the 38th Section of the Conveyancing Act of 1881 provides that, in the event of the death of one or more of the trustees, the trust estate shall vest in the survivors or survivor for the time being. The limitation of this clause by Sub-section 2 to trusts created after 1st January 1882 may be disregarded, as it is well settled law that, in the absence of very special circumstances, the trust estate survives and devolves on the surviving trustees.† It will sometimes happen that all the trustees are dead, and the executor of the last deceased trustee claims payment, refusing to appoint new trustees. In such event, it is very difficult to say what course should be adopted by the Office. Is the receipt of the executor a sufficient discharge for the money, or should the Company insist on the appointment of new trustees? I have been at considerable pains to obtain an authoritative statement of the law on this head, but without avail, though, so far as I have been able to infer, the better opinion is that a payment to the executor is good.

Trustees may delegate Collection of Policy Monies.

The 56th Section of the Conveyancing Act authorises a solicitor to receive payment if he produces a *deed* containing a receipt for money payable, and signed by the party entitled to receive. But it was decided, in *In re Bellamy* ‡ and in *In re Flower*, § that this power only extended to absolute owners, and did not authorise trustees to delegate the collection of monies payable to them. The inconvenience resulting from this inability has, however, been removed by Sub-section 2 of Section 2 of the Trustee Act, 1888, which enacts that "It shall be lawful for a trustee to appoint a banker or solicitor to be his agent to receive and give a discharge for any money payable to such trustee under or by virtue of a policy of assurance, by permitting such banker or solicitor to have the custody of, and to produce, such policy of assurance with a receipt signed by such trustee." You are no doubt aware that, while all

* Gully *v.* Burly, 22 Beavan, 619.

† Lane *v.* Debenham, 11 Hare, 188; Jacob *v.* Lucas, 1 Beavan, 436; Doe *v.* Godwin, 1 D. and R., 259; and see Lewin on Trusts.

‡ 24 Ch. D., 387. § 27 Ch. D., 592.

the trustees must join in giving a receipt, the receipt of one only out of the several executors is sufficient. An executor of one who had a policy on the life of another is entitled to borrow on it, and it is not incumbent on the Office to inquire into the *bona fides* of the transaction, except there be strong reasons to suspect *mala fides*.*

Bankruptcy Law and Voluntary Assignments.

We may now pass on to consider some features peculiar to voluntary assignments as distinguished from assignments for valuable consideration, and we may premise by remarking that every assignment is voluntary where the consideration for the transfer is not some substantial benefit or advantage, such as money or marriage, to the assignor, *e.g.*—an assignment for natural love and affection is voluntary. I have already mentioned to you that the statute 13 Eliz., c. 5, renders a voluntary assignment void as against creditors, and we shall now see that the present Bankruptcy Acts have established a limit to the period within which the assignment may be set aside. The 91st Section of the English Bankruptcy Act of 1869, and the 52nd Section of the Irish Bankruptcy Act of 1872, provide that any voluntary assignment may be set aside by the assignees in bankruptcy if the assignor becomes bankrupt within two years from its date, and should bankruptcy occur outside two but inside ten years from the date of the assignment, it may still be set aside, unless it can be proved that the assignor at the time of the transfer was able to pay his debts in full without the aid of the property transferred. Both these Acts only apply to traders (the term is used in its ordinary acceptation). The Bankruptcy Act of 1883, however, extended the liability to non-traders in England, but the Irish Act of 1872 remains unaltered, and, as a consequence, if we are dealing with a voluntary assignment by a non-trader the provisions of the 52nd Section may be disregarded.† The effects of these Acts on voluntary assignments are easily apparent. For the first two years the title of the volunteer is entirely contingent on the continued solvency of the assignor, and for eight further years the like contingency exists, though in a more modified form.

In these circumstances, therefore, the Office could hardly, with safety, accept a surrender from the assignee or advance him a

* Keane *v.* Roberts, 4 Mad., 357; Bonney *v.* Ridgard, 1 Cox, 145.
† See Kisbey, "Law and Practice of Bankruptcy in Ireland."

loan, and in the event of the bankruptcy of the assignor in the ten years, care would be required to ascertain if the creditors had a claim on the policy before payment of the amount assured. I have been careful not to state, positively, that the Office could not accept a surrender or advance a loan, because the consideration of this question may be approached from another point, viz., as to the position of one who purchases for value from a volunteer. Now, there is ample authority for the statement that a purchaser for value from one claiming under a voluntary deed acquires a better title than the volunteer, and that his claim is to be preferred to that of the creditors generally,* and such being the case, it may well be argued that the payment of the surrender or loan would confer a title on the Assurance Company indefeasible by the creditors as represented by the assignees in bankruptcy. This point is, however, not free from doubt, and I fancy the volunteer is not given the benefit of it.

Must Assignees in Bankruptcy Serve Notice?

Formerly it was held that the assignees in bankruptcy were not bound to serve notice of bankruptcy on the Office to protect their claim, but *Palmer v. Locke* † has altered the law, and it is now necessary for them to serve notice like any other assignee. And another important change in the bankruptcy law has been effected by the decision in *In re Ibbetson,* ‡ which decided that an assignee need not serve notice to prevent the policy passing to the assignees in bankruptcy on the subsequent bankruptcy of the assignor. These decisions have settled vexed questions in England; but it is eminently doubtful if the like law prevails in Ireland. Certainly, so far as the necessity of the assignees in bankruptcy serving notice is concerned, the case of *M'Entire and Another v. Potter & Co.,* § which was a case decided in England, under the Irish Bankruptcy Law, so recently as February 1889, goes to show that there is no such necessity. The case is so pertinent to our present inquiry that I venture to recite it at some short length. The plaintiffs are the official assignees of the Court of Bankruptcy in Ireland, the defendants were a firm of insurance brokers in London, and the subject matter in dispute was a policy of marine

* Morewood *v.* South Yorks. Co., 3 H. and N., 798; George *v.* Millbank, 9 Ves., 190; Kevan *v.* Crawford, 6 Ch. D., 29; *In re* Johnson, 20 Ch. D., 389.

† L.R., 13 Ch. D., 381.

‡ 8 Ch. D., 519.

§ 22 Q.B.D., 438.

insurance (a precisely similar class of property to a policy of life insurance) effected by the defendants on a vessel belonging to Guy, a shipowner in Dublin, and for his benefit. This vessel was subsequently lost, and, shortly after the loss, Guy became bankrupt, but no notice of the bankruptcy was served on the defendants, who, being unaware of the state of his affairs, paid the money over to him. On action, instituted to recover the monies from defendants as belonging to the creditors, one of the pleas of the defence put in was based on the absence of notice of the bankruptcy; but Mr. Justice Cave held that, under the 267th Section of the Irish Bankrupt Act, 1857, there was no necessity for plaintiffs to serve notice, and that they were entitled to recover.

Stamp Duties. The Stamp Acts of 1888 and 1891 have cast upon Insurance Companies all the responsibilities of dealing with unstamped or insufficiently stamped documents. A certain acquaintance with these Acts is, therefore, of prime importance. Under the 118th Section, Subsection 1, of the Act of 1891 (corresponding with the 19th Section of the Act of 1888), the assignee of a policy of life insurance is unable to sue unless and until his assignment is properly stamped, and no payment is to be made him under the assignment so long as any irregularity in the stamping exists. Furthermore, Subsection 2 provides that "if any payment is made in contravention of this section, the stamp duty not paid upon the assignment, together with the penalty payable on stamping the same, shall be a debt due to her Majesty from the person by whom the payment is made," and the 117th Section cuts off the only loophole through which it might have been possible to evade the terms of the 118th Section by enacting that, in the case of instruments executed after 16th May 1888, all contracts to indemnify on account of a payment made on an unstamped or insufficiently stamped document shall be void. The terms of these sections are stringent, and Mr. Alpe, in his work on the "Law of Stamp Duties," informs us that they were passed "to check the laxity of practice of Insurance Companies in paying out monies assured to persons who claimed under unstamped assignments." But this laxity was in no sense real, its apparent existence was a consequence of the state of the law as it stood before the Stamp Act of 1888, and so far as this Act has altered the law, the result has been a distinct gain to the Insurance Companies. In the state of

the law as it was before the Stamp Act of 1888, if an Office refused to pay an assignee under an unstamped or insufficiently stamped deed, it was open to that gentleman to bring the Company into Court, and having taken the precaution to stamp his document before bringing it in, he would at once obtain a decree with costs against it. In short, the Office was in a most unfortunate plight. If it paid on an unstamped deed, it clearly did a wrongful act, while if it sought to protect the revenues of the State, the law rewarded its solicitude by enabling the assignee to be revenged on the Company which had insisted on his doing what he ought to have done. However, as we have seen, the Acts of 1888 and 1891 have altered all this by divesting the assignee of the power to sue until his documents are properly stamped, and now the plea of non-stamping would be a good defence to the Office.

Are the Stamp Acts Retrospective?

A very great diversity of opinion exists as to whether these Acts are retrospective. On the one hand, we have it on the high authority of Sir Horace Davey and Mr. Ingle Joyce (*vide* queries submitted by the Life Offices Association to those gentlemen, *Post Magazine*, 12th July 1890) that the Acts are retrospective; while, on the other hand, we have the no less respectable authority of the Irish Lord Chancellor and Mr. John Rigby in support of the view that the Acts are not retrospective. The Commissioners of Inland Revenue, however, state that the Acts are retrospective, and, in the absence of a judicial decision, I opine that their view should be adopted. The wording of the 117th Section would appear to countenance the view that an indemnity may be taken in the case of instruments executed before 16th May 1888. The value of such an indemnity is not easily ascertained, and it may very well be doubted if any Judge would enforce an agreement made in consideration of a fraud on the revenue. Such agreements, indeed, in the cases of *Abbott v. Stratton*,* *Owen v. Thomas*,† and *Harris v. Chapman*,‡ have been held to be void.

All Deeds should be Stamped.

On the queries submitted to them by the Life Offices Association, Messrs. Sir Horace Davey and Ingle Joyce reported *inter alia* that if A assigned to B by unstamped deed it was not possible for B to reconvey with the object of taking a properly stamped document in exchange, but that the first

* 3 J. and L., 616.
† 3 Myle and Kent, 353. ‡ 17 L.T., 517.

deed should be stamped, also that when a title to a policy consists of several documents, all should be stamped. In the last case, however, if some of the documents evidenced a transaction which was closed before the policy came to be dealt with, the Commissioners do not require that they be stamped; thus, if a mortgage and its release be in the chain of title, inasmuch as they eliminate a particular transaction, they may be passed through unstamped (*vide* Alpe on "Law of Stamp Duties"). If a policy which is subject to any debt, half credit premiums, loan, &c., is sold, the assignment should bear conveyance duty sufficient to cover the amount paid by the assignee, *together with* the amount of the debt and interest on it to date of sale.* I have noticed that the omission to include this debt has been a fruitful source of irregularity in stamping. The stamp duty on a mortgage—2s. 6d. per cent. if mortgage is by deed; 1s. per cent. if under hand only—need only cover the principal sum; the covenant to pay premiums does not attract duty,† even though it be agreed that such premiums are to be treated as principal monies and to bear interest.‡ A conveyance for natural love and affection is properly stamped with 10s., no matter what the amount of the policy be, as is also a conveyance for a "nominal consideration," *e.g.*, for 5s. If a policy is settled, and no provision is made for payment of the premiums, the settlement will be sufficiently stamped with *ad valorem* duty—5s. for each £100 settled—on the amount of the surrender value at the date of the settlement.§ If, however, provision is made for payment of the premiums, the duty is assessed on the sum assured and bonuses to date.

Titles.

When the policy becomes a claim, it should be delivered up to the Company, though if it be lost its non-production will not debar the parties from recovering, but the Company will be entitled to demand an indemnity.‖ In the event of no dealings being recorded, the executor or administrator will receive payment, and the 19th Section of the Inland Revenue Act, 1889, provides that policies may now, in all cases, be paid on the probate of place of domicile at date of death. If dealings are recorded, all documents connected with the notices should be

* Sec. 73, Stamp Act, 1870; Sec. 57, Stamp Act, 1891.
† Stamp Act, 1891, Sec. 88 (3).
‡ Lawrence *v.* Boston, 7 Ex. R., 28.
§ Stamp Act, 1870, Sec. 124; Stamp Act, 1891, Sec. 104.
‖ Bushnan *v.* Morgan, 5 Sim., 635.

inquired for, as their non-production may be due to the fact that they have been deposited as security elsewhere, or the dealings may be such as to irrevocably divest the assignor of the power of further conveying, but it by no means follows that a Company has a right to demand production of all documents of which it has notice, and a good deal of discretion has to be exercised as to what deeds should or should not be insisted upon. A large proportion of policies issued, sooner or later, find their way into the hands of a banker as security, and when the loan is repaid the policy and mortgage are simply handed back, no release being executed, and the question arises as to how the mortgage must be released before the mortgagor is paid. The general rule as to reconveyances is that any agreement must be released by the same method by which it is created; if by deed, the release should be by deed; if by other writing, then the reconveyance should follow the same form; but, on the other hand, it has been decided that a mortgagee may release the mortgage by simply writing "cancelled" across it, and signing his name.* Moreover, it is not necessary that any reconveyance duty should be paid; a receipt stamp is not even required if the mortgage be duly stamped (*vide* Stamp Acts, Receipts, Exemptions), but *nota bene* a receipt stamp is required on a receipt endorsed on a policy for any monies payable thereunder, and it has been held that if the receipt contain the words, in "settlement of all claims," it is liable to stamp duty of 6d. as an agreement.† If all the documents produced relate exclusively to the policy they should be retained, but if they deal with other property they must be returned, and an undertaking for their production obtained. This undertaking to produce is liable to agreement duty of 6d. Mr. Bunyan ("Law of Life Assurance") says that, in addition to the undertaking to produce, certified copies of the documents should also be supplied at the claimant's expense. While on the subject of production of documents, it may be noted as a matter of practical interest that, in *In re Haycock's policy* (1 Ch. D., 611), it was held that a Company was justified in refusing to pay the absolute assignees of a policy until it was satisfied that a prior mortgage, of which it had received notice many years previously, had been satisfied, and that it was the duty of the claimants to satisfy the Company on this point.

* Harrison *v.* Owen, Atk., 520; Gumme *v.* Adams, 19 L.J., N.S., Ex., 40.
† T.L.R., 13th Dec., 1889.

Married Women.

Any notes on assignments would be incomplete did they fail to notice the powers which married women possessed, and possess, for dealing with policies; and, while I fear your patience must be exhausted, I must presume further on your good nature while I conclude with a few remarks on this branch of the subject. It will probably simplify matters if we consider separately the law as it was (1) up to 1857; (2) from 1857 to 1870; (3) from 1870 to 1882; (4) from 1882 to present time.

Policies Effected before 1857.

Up to 1857, if a woman, before or after marriage, became entitled to a policy, either on her own life or on the life of another, the interest in such policy became, and, as regards all policies before 1857, is still vested in her husband, subject only to his being able to reduce it into possession, *i.e.*, to receive payment, and, therefore, if the policy is on a life other than the wife, on its fall the husband was, and still is, entitled to receive payment; while, if the life assured is the wife, on her death, he, as her administrator, is the party to be paid. The right of the husband to receive the monies is, however, entirely dependent on their falling due in his lifetime—if he predecease the wife, she at once becomes absolutely entitled to the policies, irrespective of, and unfettered by, any dealings he may have purported to make with them. Moreover, this right of survival was one which the wife could not, and cannot now, by any means divest herself of,* and some of the consequences resulting from this restraint are a disability to borrow, to surrender, or to assign the policy during coverture. The foregoing remarks would not apply, however, if the policy were settled on the wife to her separate use, and she paid the premiums on it out of her separate estate, as in this case she might deal with it in all respects as if she were a *femme sole*,† and she might also effect a policy on her own or her husband's life out of her separate estate.‡

From 1857 to 1870.—Malins' Act.

As to any reversionary property accruing to a married woman, or to her husband, in her right by any instrument, except her marriage settlement, made after 31st December 1857, she is enabled by Malins' Act, 20 and 21 Vic., c. 57, to dispose of it by a deed acknowledged by her husband, provided

* Winter *v.* Easum, 10 Jur., N.S., 759; Purdew *v.* Jackson, 1 Russ., 66.
† Hulme *v.* Tenant, L.C., 521.
‡ Read *v.* Royal Exchange, Peake's Add. Cases, 70.

that the instrument under which she claims contains no restraint on anticipation. She may, therefore, within these limits, deal with a policy to which she became entitled after 1857.

From 1870 to 1882.

The Married Women's Property Act of 1870 (Section 10, Sub-section 1) enabled a married woman to effect a policy on her own or her husband's life for her separate use, and Sub-section 2 enabled a husband to effect a policy on his own life for the benefit of his wife, or for his wife and children, or any of them, and so long as any of the beneficiaries were alive the policy was held to be a trust for them, and not to form part of the husband's estate. Furthermore, in the event of the husband's bankruptcy, the policy did not pass to the creditors, but if it appeared that the policy was effected and the premiums paid with intent to defraud them, they would be entitled to recover out of the sum assured an amount equal to the premiums paid. A married woman, having effected a policy under Sub-section 1, may deal with it as her absolute property by assignment *inter vivos*, or by will, and should she die intestate her husband, on taking out administration, will be entitled. If the policy be effected under Sub-section 2 for the benefit of the wife only, she may also deal with it as her absolute property,* but if prepared for benefit of wife and children, the beneficiaries could not give a good title on assignment, because their title is contingent on the life assured predeceasing them, and for the same reason the title of the latter is not absolute.

There has been some difficulty in ascertaining the nature of the interests conferred by this Act on a wife and children when the policy has been effected for their joint behoof, and the few cases before the Courts have been mainly concerned with this point. In the case of *Mellor's Policy Trusts* (L.J.R., 47, Ch. 246, July 1877), a policy was effected in 1874 by a husband for the benefit of his wife and such of the children as might survive him. He died in 1877, leaving a widow and two daughters, both minors. In the first instance, Vice-Chancellor Malins ordered that the wife should take a life interest in the entire fund; but, on a representation that the amount at issue was small, £400, he altered his order, and gave the wife one-third and the children two-thirds of the fund. *In re Adam's Policy Trusts* (23 Ch. D., 525), a husband, in 1874, effected a policy for £2000, afterwards reduced to £205, for the

* Seyton *v.* Satterthwaite, 34 Ch. D., 511.

benefit of wife and children under the Act of 1870, and died in 1882, his wife and one child having predeceased him. Seven children survived, and on a petition as to their rights Mr. Justice Chitty expressed the opinion that the wife took no interest, and that the children took as joint tenants, but that if the wife had survived the assured, she would have taken a life interest in the fund. But in *Seyton v. Satterthwaite* (34 Ch. D., 511, February 1887), which was before the Court to establish the rights of the widow and children in a policy under the Act of 1870, Mr. Justice North, after a full review of the authorities, dissented from the decision laid down in *Adam's Policy Trusts*, and decided that the widow did not take a life interest, but was entitled to a share in the capital jointly with the children. This appears to be the last case on the subject, and it is greatly to be hoped that the law is now settled and free from those deplorable doubts and difficulties so fatal to the easy conduct of business. In the last case, the Judge mentioned that children born after the date of the policy would be included amongst those living at its date. Provision is made in the Act for appointing a trustee, or trustees, to receive the monies assured, and it would appear to be necessary to appoint a trustee in all instances.

From 1882 to Present Time.

The Married Women's Property Act, 1882, repealed that of 1870, but without prejudice to any act done within the twelve years under the latter. It does not very materially differ from the Act of 1870, but affords greater facilities for appointing trustees to receive payment, and contains an important provision, enabling the legal personal representative of the assured to give a good discharge to the Office in the event of no trustees having been appointed. Almost all the remarks in connection with the Act of 1870 will apply to this Act, and I shall not pursue the matter further; but I would wish to remark that those desirous of prosecuting their inquiries into the merits or demerits of these Acts of 1870 and 1882, will find "Observations" thereon by Mr. William Hughes, contained in the January (1888) number of the *Journal of the Institute of Actuaries*, very profitable reading.

Conflicting Claims. Interpleader.

In conclusion, it only remains to note that if there be conflicting claims to a policy, the Company may call on the parties to interplead, that is to say, it may insist that they contest the matter between themselves, without making the Company a party to the action. In other words, and to divest

the subject altogether of technicalities, a Company, on being made aware that there are adverse claimants, may reply that the quarrel is none of its, and may leave the combatants to fight it out among themselves.

The Company may then get rid of the matter by lodging the money in Court, as provided by Section 28, Sub-section 6, of the Judicature Act; but if the policy monies be the subject of a trust, the lodgment must be in virtue of the Trustee Relief Act.

In adopting this course, the Company does not entirely shirk responsibility, and if it appears to the Judge that it acted with unnecessary or over-caution, it will have to bear all costs of paying the money out.*

Gentlemen, I have now exhausted my notes—I fear I have exhausted you all long since. We have travelled over a wide subject, and I have only been able to touch upon its several heads in a very superficial manner; many points, indeed, I have had, perforce, to ignore. I have endeavoured to collect and lay before you what may be termed the "leading principles" of the law as to assignments, and I have here and there pointed out where doubts exist, and where caution must prevail. It would be very gratifying to me to think that I am fortunate enough to have promoted clearer ideas, or to have elucidated any matter bearing on the subject. But while my success in this direction is problematical, one thing, at least, I feel confident must be apparent to all, viz., that the Law Department, like the many others in the economy of that great system, an Assurance Office, is not worked by a rule of thumb, and does not lend itself to methods merely empirical, but affords, rather, much scope for the application of those abilities, and the exercise of those powers of discrimination, the fostering and direction of which I take to be the chief object of this and kindred Institutes.

* Mathew *v.* Northern Insurance Co., 19 Ch. D. (1878); *In re* Carroll's Policy. L.R. 27 Ir., 86 (1892).

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Insurance Institute of Ireland,
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INSURANCE FIELD WORK: ITS LIGHTS AND SHADOWS.

WHEN the Secretary, on behalf of the Council of our Society, did me the honour to ask me to read a paper before you, my first inclination, prompted by that diffidence so characteristic of Insurance men, and especially of those who have had an outside training, was to try to escape from a task which I knew I was none too well qualified to fulfil. Your secretary, however, would have none of this; and as he indicated that a subject connected with the field work of our profession would be acceptable, I consented to address you, feeling that on such ground I ought to regard myself as more or less at home. But I am well aware that I speak in the presence of some past masters in field work, at whose feet I could sit with much advantage to myself. To these gentlemen I would say that my remarks, which to them must seem trite and common-place, are not offered as mental pabulum for their consumption, but are intended for the benefit of the younger members of the Society, whose attention I desire to direct to an important sphere of work which is too often neglected in consequence of erroneous ideas regarding its responsibilites and difficulties.

I propose, first, to refer to the possibilities of this field of work for a young insurance man full of ardour, and desirous of making his way in the profession which he has chosen. There are many such young men, and I think I shall not go far wrong if I say that, in the majority of cases, they know no more about the steps to be taken to qualify for field work, or the risks it would be prudent to run in pursuit of that object, than a monkey does about the cube root.

Doubtless there are many departments in an insurance office into which the young man just emerging from his apprenticeship* may enter with a view of his remaining permanently, or for a time,

*In Scotland an apprenticeship of four years is usually required in the case of juniors entering an assurance office.

therein; and I have no desire to belittle in any way the importance of the actuarial department, or of the legal, the accountants', the fire policy, fire loss, fire guarantee, life proposal, life policy and claims departments, or the accident or sickness departments. But alas! in all these, skilled labour, of however high a class, cannot in the bulk look for rapid promotion. The posts of responsibility are few; they are filled by competent men; and there is a long and ever-lengthening *queue* of equally efficient units waiting to fill the shoes of those whose posts become vacant. Now, this does not hold good with the outside department. Of it one can truthfully say that the harvest is indeed plentiful, but the labourers are few, and in it a man of the proper stamp can carve his way ahead with lightning rapidity.

One of our vice-presidents, in a recent address to us, said it was currently believed that an outside man, like a poet, was born, not made; but that, in his opinion, the outside man could be considerably improved upon after birth. This is very true, and I would have the improving process commenced at the earliest stages of office training, in order that the individual, who later in life finds himself the fortunate possessor of the priceless gift of power to sway his fellow-men, may, ere this discovery, have already educated himself in the intricacies of other departments, and may thus be enabled, when his assiduity in outside work has landed him on the higher rungs of the ladder, to look still upwards and to grasp with self-reliant hand the topmost rungs of all.

Now there is one way, and only one way, in which the aspirant to insurance honours can attain this result. It is by occupying the years wherein, by reason of his youth, he is debarred from holding any position in the official ranks of the field force, in gaining and garnering up as much knowledge as possible of all departments. It is in the highest degree unsafe to defer mastering the technicalities of the business until after one has attained an outside position. There have, no doubt, been cases in the past—two have occurred within my own knowledge—of men who actually pursued actuarial studies, and passed the examinations of the Faculty of Actuaries, while engaged in the heat and turmoil inseparable from the life of a branch secretary. But either there were giants in those days; or competition could not then have glowed with the intense white heat which it exhibits to-day. And I venture to prophesy that in the new century on which we have now entered, these rare instances are not likely to be repeated.

It therefore behoves a young man to get his knowledge of all departments, or at least of as many as lie within his power, before the trumpet calls him to take the field.

Many of you here, through being employed in branch offices, have better opportunities than those engaged in head offices of gaining a general experience of several departments in a short time. But the head offices, although having some disadvantages, possess counterbalancing advantages, in respect that they contain departments which are practically unknown at the branches. To the head-office junior I would say, first thoroughly master the details of the department in which you are placed, and then make every effort to secure a transfer to some other department. This may be difficult of accomplishment, in some cases, but where the junior is thoroughly in earnest, and gives entire satisfaction to the head of his department, he will generally succeed in his object. Heads of departments, whose first care is, naturally, to secure the utmost efficiency in their own respective departments, may not be disposed to call down blessings on my head for tendering advice of a kind which (if universally acted on) might increase their difficulties. But behind the stern and uncompromising exterior of the departmental head, there beats, in most cases, a kindly heart; and if the junior succeeds in convincing his superior officer that he is in earnest in his quest for knowledge, and that he is at the same time serving the Company to the best of his ability, there will seldom be any lack of sympathy on the part of the head of the department, or any disposition to retard the junior's advancement. Mr. Smiles, the well-known author of *Self Help*, in his *Life of George Moore*, the eminent commercial man and philanthropist, tells that Moore's brother commercials, impressed by his unremitting toil and by his unselfish efforts for others, used to gather in his stock-room of an evening to help him to pack his samples, so as to enable him to take a few hours' rest before he started by an early morning train to put in a full day's work in the next town which he had to visit. Such a life teaches the lesson so well put in Addison's lines:—

> "'Tis not in mortals to command success,
> But we'll do more, Sempronius, we'll deserve it."

We will suppose now that the budding inspector of agencies has reached the stage when he has left his apprenticeship behind him, has been in many departments, can draw a neat plan, without

wasting time unnecessarily over it, can survey risks rapidly and accurately, can calculate fire premiums, draft specifications, keep books, and perhaps can even write the magic letters F.F.A., or F.I.A., after his name. He has probably attained to a position of comparative comfort, his salary, while not princely, being sufficient to maintain him, and to leave a modest margin for such absolute necessities of the present day as a silver-mounted cane and an ample supply of cigarettes. And it would seem as if this position were sufficient to satisfy the ambitions of many! But to the man of wider views I would say: Study now the possibilities of field work, and your own latent powers, so far as you are able to gauge them; and if you come to the conclusion that you are more or less fitted for that kind of work, do not hesitate to relinquish all the comforts attaching to an indoor position, and to seek for and obtain an outdoor post. It must, of necessity, be a lowly one to commence with, but it may lead ere long to fame and fortune, and it is pretty certain to do so if you possess the requisite qualifications.

Now, if we were seated, two together, having a private informal talk on this subject, I doubt not that one of the first questions which the budding inspector would put to me would be: "What sort of a life is that of a young inspector of agencies?" And in the interests of truth I should feel obliged to answer that, judged by ordinary standards, it is a dog's life. But, like the stage, the army, or the sea, it exercises over many minds a peculiar fascination. It differs, however, from these callings in respect that the glamour comes after, not before, acquaintanceship with the work, and that it is therefore more lasting, being founded on experience, and not on the vagaries of the imagination.

To begin with, the life is physically a hard one. No weakling need attempt to cope with it. Early trains have to be caught. Late trains—sometimes very late ones—have to be used, to get further afield, or for return journeys. Long drives in all sorts of vehicles, in all descriptions of weather, at all times of the year, go to fill in many a day and many a week in the life of an inspector, and also of a branch secretary, or at least of a branch secretary worthy of holding that title. Meals are as uncertain as are the working hours. Dinner may have to be taken in the early afternoon, without appetite, with the alternative of having the appetite without the meal, and of delaying the meal until "the wee short hours ayont the twal." These discomforts must often be submitted to by the inspector who has a large country district to cover; and

what I have said will indicate that, in addition to the Chesterfieldian graces which the field man ought to possess, he must have a digestive apparatus closely approaching that of an ostrich, and the endurance of a Sandow.

Then, one has to mix with all sorts and conditions of men. This is by no means a drawback, but quite the reverse, the novice thereby getting his ideas broadened and his angularities rubbed off, until, if he be of the right material, he becomes a polished man of the world. But the process often involves associating very closely, and for long periods, with men whose ideas, manners, customs—everything—are entirely at variance with our own. I do not mean by this that the other man's ideas are necessarily at fault. It may be ours which are wrong; but, on whatever side the fault lies, the fact remains that such close companionship can become most irksome, and, to some temperaments, almost unendurable.

Then, towering far above these smaller affairs, there are the terrible anxieties of the life, and the bitter disappointments which are occasionally met with. You may say that these are inseparable from all business pursuits. True, but if the matter be regarded dispassionately, and if a comparison be carefully made, I think an independent inquirer would be compelled to admit that the commercial side of insurance work contains a larger share of anxieties and disappointments than can be found in almost any other business. However, such an inquiry and comparison falls outside the scope of my paper; and I shall not take up your time by offering proofs in support of this view, which is merely mentioned in passing as an opinion held by myself and shared by many others whom I have met.

At times, when "the best laid schemes . . . gang agley," when business of all kinds seems as much beyond reach as the North Pole, when agents cannot be stirred to move an inch, much less to reach the measure of activity which you would like to see, then all the world seems very dark, and the life of the field man is a very depressing one.

I know the popular idea entertained by junior members of the staffs of insurance companies regarding the inspector. He is that happy individual who strolls in and out of the office at his own sweet will, carrying a neatly rolled umbrella, and wearing a seraphic smile, apparently without a care in the world. But the more experienced know better. They are aware that under that smiling

face and optimistic manner there may be raging a very hell of doubt and fear and anxiety.

When business seems to be at a standstill, even the most tried and case-hardened field man begins to ask himself if the fault lies at his own door, and if, indeed, his hand is beginning to lose its cunning. You can imagine, therefore, how much more seriously such a state of affairs must depress the beginner, who has had little in the shape of past results to show, and who has never felt his foothold too secure. And in this point lies the main terror of the life.

Enough, however, of the shadows. I have mentioned a few merely to indicate the necessity for giving due consideration to the requirements and difficulties of the life before choosing it.

Strength of will as well as strength of body is required for the work. No "haw-haw" young man need attempt it. You know the sort of creature I mean. "Too awfully beastly jolly, don't you know. Three tennis parties and two dawnces last week. Awfully jolly girls, don't you know." He should stick to his tennis parties and his "dawnces." There is no room for him in the ranks of outside workers, where men and not jellyfish are required.

The right sort of man will not be deterred by the recital of any number of drawbacks attaching to the life; and I can assure him that the shadows do not predominate.

The life, if a heavy drain on the physical powers of the delicate man, is, for the strong man, an extremely healthy life. Abundance of fresh air and exercise, with continued change of scene, keep the strong man in health. The change of environment alone is of great value in keeping a man free from that narrow parochialism so pronounced in many who lead stay-at-home lives. You get to know men and manners. You mix with all ranks. To-day you may meet the keen business man, holding a high position in an important city. To-morrow you may meet the rustic, chary of speech and slow in manner, but possibly with as keen a wit as the other when you come to know him. One hour you may spend with a man of high rank, and the next possibly with the butcher, or baker, or candlestick maker. Then, if representing an office transacting fire business, you have opportunities of seeing many kinds of manufacture as well as manufacturers. Many an "outside" insurance man sees more of the goodly twins—Commerce and Agriculture—and learns more about

their ways, than a man daily engaged in one of these pursuits. Altogether it is a life of infinite charm and variety.

I remember a branch secretary—a most successful one—exclaiming one day, after he had just completed two large strokes of business, one in the Fire Department and the other in the Life, "there is no doubt insurance is a glorious business," to which I was wicked enough to add the rider, "when things go well," for I had seen him in the blues not infrequently.

In this lies the chief charm of the life. While it can depress, it is a calling in which the strenuous worker can generally see immediate results; and the earth possesses no keener joy than the one caused when a district committed to your charge begins to pulsate and live under your hands. At first progress may seem slow, and your heart may almost fail you, but if you keep pegging away, putting in hard work and common sense, the time soon arrives when there are indubitable signs that your work of weeks or months is beginning to tell. Your mail gets heavier; inquiries become more frequent; agents, who seemed moribund and indifferent, begin to waken up; perhaps they call at the office, or they write requesting your help; and instead of wondering what you can find to do on such and such a day, you have to try to get ten days' work into six, and you begin to wish that you could cut yourself into halves and do the work of two men. That is indeed "living," and *there* lies the true explanation of the fact that so hard a life can be so joyous a life. When success is achieved everything around you tells the delightful news. Your registers tell it; your premium incomes from the different departments tell it; all things, even the most trivial, connected with your office and district unite in proclaiming to you that your efforts have at length met with their due reward.

I pass from the general subject of the drawbacks and the delights of the business, and I shall now endeavour to indicate the manner of man who is justified in venturing to embark on the life which I have tried to describe; and shall also attempt to specify some of the qualifications likely to lead to success. I only wish it were in my power to offer precise and detailed directions suitable for the circumstances, and to promise that those who do their best to follow these directions will infallibly succeed. But although I cannot give such directions, or make such a promise, I am able to say that there are three essential qualifications for such work, and that when these three qualifications are found united in the same

individual—be he an independent agent or a salaried official—I have never, in my twenty-seven years' experience of insurance life, known failure to occur.

The three qualifications are

1st.—Hard work.

2nd.—What for want of a better name I shall call "grit."

3rd.—Tact.

I give these in the order in which they occurred to me, but if I am asked to arrange them in the order of their importance, I must confess myself unable to do so.

On the first mentioned it is unnecessary to dilate. We all know what hard work is, and the intimate relationship which it bears to success of any description in this world. "Whatsoever thy hand findeth to do, do it with all thy might" stands out as a piece of solid advice which no one among us can afford to disregard.

By "grit," I mean force of character, staying power, and the determination to let nothing turn you aside from your fixed purpose. Now, do not misunderstand me. By no means do I desire to encourage effrontery. In some quarters an idea seems to exist that, in order to succeed, an insurance man must be a leather-lunged, brazen-faced, self-assertive individual. Never was a greater mistake made. That stamp of man may sometimes succeed, but he does so in spite of these qualities, and not because of them, and his success is due to his possessing many good qualities which, happily, obscure or excuse the faults which otherwise would absolutely preclude success.

The most successful outside man I have known—still a very young man—when first taking to the "road" as a youth, blushed if anyone spoke to him suddenly, and the association with the rough and tumble of such a life was for a long time torture to him. Nevertheless he realised that in that way alone lay his chances of promotion, and he fought against his natural disinclination for the work, and conquered. This is only one example out of many which I could give you to illustrate my meaning, but I may be able to bring it out more clearly by showing you the reverse of the picture.

The man who is always seeing lions in his path lacks "grit." If in England representing a Scottish office, or in Scotland representing an English one, he loses heart because of the competition of the local offices. If located as a branch man in London or Edinburgh or Liverpool, where there are many head offices, he looks for nothing but failure owing to the powerful

influence of these head offices. In fact, place him in any position, and he proves a poor, weak, "fushionless" creature, destitute of backbone. He may work hard enough, in a way, but he has no staying power. The gritty man, on the other hand, braces himself up the more firmly in the face of all these difficulties, saying to himself, "They are terrible, but overcome them I must, or I go under."

Now we reach the third qualification, "tact," and for lack of this more men come to grief in outside work than for the want of any other quality.

To be, in the true sense of the apostolic injunction, "all things to all men," is as necessary as food or raiment for an outside insurance man. Now, again, I would say, do not misunderstand me. I do not for one moment suggest that you ought to don the cloak of hypocrisy. No, the slightest touch of that evil thing is not only wrong, but it is absolutely fatal to the permanent success of any business man. The quality indicated is something very different. It is the gentle art of making friends by putting yourself in the other fellow's place, by thinking of him, his wishes, his likes and dislikes, rather than of yourself and your own wishes. This valuable quality unfortunately seems to be becoming rarer and rarer every year. It is this that binds an official to his agents, and creates a relationship between them without which success is impossible, be the office represented large or small, ancient or modern.

Many inspectors seem to think that the actual carrying through by themselves, rather than by the agent, of each individual proposal is the be-all and end-all of outside work. This is not so. The powers in that direction of the individual inspector or branch secretary are limited by what it is possible for one man to do. He has only twenty-four hours in the day to dispose of. He must employ a few hours in sleep, a few more in stoking the human engine, and even if he be a Hercules he cannot put in on the average more than twelve hours' work per day; and if he insists on personally completing every proposal from his district, he must necessarily fail to attain the figures which his company is entitled to expect from the district, and which might easily be attained if such a relationship were established with the agents as to induce them to complete business themselves whenever this is possible. What an inspector, branch secretary, or general manager requires is a band of inspired workers, working no doubt for their own in-

terests, as represented by such unpoetical things as salary or commission, but at the same time working for their companies with goodwill, trust, and esteem.

I have never found business difficult to get when once in touch with the general public. Given a territory with agents willing to work, and the main difficulty is already surmounted. But in the case of an organiser introducing himself into a new district, fully half of his work will produce no immediate result, but will tell in future years. In such a case tact will be very helpful in accelerating the results. The outside man must enter into the joys and sorrows, the aspirations and disappointments of the circle in which he is located, identifying himself with it, and gaining the friendship, respect, and esteem of those among whom his lot is cast. Without this his work, however hard, will probably prove a failure; but with it, success is, in my opinion, certain to result from hard work and "grit."

Strong views may be held by the outside man on many subjects, and he may take a keen interest in various pursuits; but if these views and pursuits are not in harmony with those of an agent who has consented to devote a considerable portion of his time to the business of the Company, the tactful outside man will not needlessly and selfishly obtrude them on the agent with whom he is working. When driving over a country side for days together with an influential agent, the outside man has many opportunities of making the campaign a positive pleasure to the agent, and after this has been accomplished he finds no difficulty in the future in getting that agent to repeat the campaign, and in time to look forward to such opportunities of working with the inspector as one of his chief enjoyments. This is accomplished by subordinating self, and by taking an interest in the affairs of the agent, and thus leading him to take an interest in you as well as in the Company. Suppose that instead of adopting this course the inspector selfishly goes ahead talking of his own pet fads, in which the agent has no interest, the journey in that case will be apt to become irksome to the agent, although he may tolerate it, in consequence of its yielding some commission to him on the business obtained.

Some unpardonable faults in this direction are committed by outside men. A sporting inspector is perhaps unable to refrain from entertaining a strait-laced Nonconformist agent with hints as to the odds and probable winner of the Derby, or the chances of the Battersea Bruiser in a contest with the Putney Pet. Or

an inspector with strong convictions as to the evil influence of the Roman Catholic Church may have, as his companion for a time, an agent who is a pillar of that Church, or who hereditarily or by marriage is indirectly connected with that Church, although not himself a member thereof. In such circumstances, it would be unseemly and unkind if the inspector were to indulge in adverse remarks regarding things the agent held dear and sacred. And yet this sort of thing is done every day, and field men wonder why they are not successful.

Mark me, tactfulness does not mean the sacrifice of an iota of principle, or truckling to any fellow mortal for the sake of business. But, on the other hand, if a man crams his views down another man's throat, and goes through life regardless of all interests, prejudices, or wishes save his own, this stamps him as a narrow-minded, selfish fool, and not as the fine, bluff, honest fellow he may fondly imagine himself to be.

I have not as yet inflicted any stories on you to-night, and my intention was to have refrained from doing so altogether, but a story has been recently told me which so well conveys the moral which I wish to bring home to my hearers, that I am going to tell it. It is a fire story, but the moral is equally applicable to life and accident business. A building was on fire and blazing away merrily, when an old woman was discovered at one of the windows. There were no appliances of any description, no fire-engines, no fire-escape, no ladder; and both woman and building seemed to be doomed. Suddenly a man suggested that a plank be got from a neighbouring builder's yard, and that it be raised up to the window so as to enable the woman to "slither" down. This was done, and the woman's life was saved. On hearing the story told by the rescuer afterwards, a listener said to him, "Man, she must have been grateful to you." "Grateful!" was the reply. "She just rose up and walked away backwards withoot ever a word. Hoo was I to ken the plank was fu' o' jagged nails?"

Now, in raising our planks, whether they be those for developing a district, for working individual connections, or for gathering in business generally, we must see that they contain no jagged nails, but are smooth, and easy to journey upon—pleasant at the time and pleasant to the memory both of those who placed them and of those who journeyed on them.

You may take it as an axiom beyond cavil that the tactless man, or, in other words, the selfish man, has not a shadow of a chance of

success in field work; and those who cannot enter in some measure into the lives of all they meet, but feel constrained under all circumstances to think of themselves alone, and their narrow needs and petty aims, had better take my advice and leave outside work alone.

This brings me back to the statement that the outside man is born, not made. This means, I take it, that the outside man must possess a personal magnetism due to a kindly heart and a sympathetic nature. This, like the quality of mercy, blesses him who gives as well as him who takes, and oft returns with increase to the original giver as he journeys through life.

After a man has decided to try his fortune as a member of the field force, it is often difficult for him to know by what means he can obtain entry into its ranks. I think I can give assistance here by telling you how the majority of the successful men known to me managed to do so. It was by showing an interest in the work, and making a start as *amateurs*. While engaged in indoor clerical work they showed their interest in the companies which they served, by introducing useful connections. In their spare hours they tried their "'prentice hands" at building up little agencies for themselves. It by no means follows that a man who can make a start of this kind as an ordinary agent will be equally successful as an inspector; but the fact that a youth will voluntarily give up most of his spare time to such a pursuit affords strong presumption that he possesses two of the needful qualifications, these two being the love of hard work and "grit." The plea of "something attempted, something done," is the most powerful one which can be placed before a manager by anyone seeking employment as an outside man; and in the cases which I have alluded to, this plea resulted in each applicant securing the opportunity to win his spurs as an inspector.

Before bringing to a close these few remarks on a very wide subject I would ask you to allow me to say a word or two more on a point which I have already laid before you. My excuse is its great importance to the rising generation of insurance men, and to all offices, especially those which transact fire business in combination with life business. What I here allude to is the absolute necessity for being more than a one-department man. We often hear it said that in all professions, however crowded, there is always plenty of room at the top. While assenting to this as regards the insurance profession, I would add that the top can

more easily be reached by the man who knows more than one department of work. And yet nothing is more marked than the tendency among insurance men to go in exclusively for one department of work. In head offices, where everything is on a large scale, this arrangement works well. Each department is under a head, and the heads in turn are supervised by the manager. But in branch offices, and more especially in small branch offices, this cannot so well be carried out. The ruling spirit at a branch has necessarily not only to be the watchful captain, but in actual truth he has to be his own handy man in many departments, and if he does not know every department in its broad outlines, Heaven help both him and his office!

Now what do you find in actual practice? If a head office requires a fire man, an indoor life man, an additional hand for the loss or guarantee department, or a book-keeper, the manager may reckon on having fifty or more applications from good men, full to the finger-tips of knowledge of the special departments. There is no difficulty in filling up such a vacancy; and usually the manager's heart is gladdened by finding that he is able to give the coveted position to a member of his own staff. Indeed, in most cases there are quite a number of men already on the staff who are competent to fill such vacancies.

This is one picture. But when a vacancy occurs in a branch-secretaryship, a much more valuable appointment than those before mentioned, the task of finding a suitable man is by no means so easy, and often to his great regret the manager feels compelled to recommend to the Board someone outside his own staff. For such an appointment a man of many parts is wanted, an organiser, a getter of business, a fire expert, a man able to understand the books and accounts of the office. The day of the armchair secretary is over. Mere figure-heads are now relegated to junk shops, and statues can be seen to much greater advantage in public galleries than in insurance offices.

The same crowd of applicants, however, is met with, and largely with the same qualifications as in the case of the departmental clerkship. One applicant shows with great pride his parcel of plans—things of beauty, doubtless, coloured with artistic skill, with stripes signifying this and circles signifying that. Admiration can be expressed for his work, but when he is asked "How about the life department?" he scarcely seems to know that there is such a department in the office to which he is applying. If

asked what he has done in rearranging agencies and increasing the fire income, he probably answers that such work has not been in his department. Other people have done that work. In the company in which he has been trained the business has been brought in by others, and his work has been to pick holes in it, or to draw pictures of it. He could not condescend to such work as looking for business, and yet he is so ignorant or so impertinent as to come forward and ask for a position which calls for knowledge, and very extensive knowledge, of the business-getting department! And so on through all or nearly all the applicants. Each exhibits proudly his little bit of departmental knowledge; but one is reached at last, a live man this. He has seen the requirements of companies for such appointments. He has used his few years of business life in fitting himself for such a position. To the field he has gone, after gaining his technical knowledge, and he has struggled and conquered as an inspector or business-getter, and now he is going to be advanced several stages nearer to that goal which he has had in view all along. Gentlemen, believe me when I say that, of all the arrows in your quiver which you are able to show when you face the ordeal of an application such as that I have referred to, the one which will be most useful to you will be that inscribed with the words "successful field work."

I have in this paper endeavoured to give the younger members of this Society some idea of the sort of work required of the outside man, not concealing its discomforts, which are many, and not unduly exalting its pleasures, which are also many; and I would only now add that if the life has hardships, anxieties, and worries beyond those of any other department of our business, it has this great advantage: that in it a man, at less expenditure of time and capital than is required in most other walks of life, is able to fit himself for posts of honour and responsibility. And even should he not rise to any very high position in the ranks of insurance officials, the life is one in which he can, with clean hands and a thankful heart, serve his God, serve his company, his day and generation, and himself.

ROBERT CHAPMAN.

Insurance Society of Edinburgh,
December 16, 1902.

NOTES ON SOME LEGAL MATTERS IN RELATION TO LIFE POLICIES.

Some slight knowledge of the broad principles of law relating to policies is so essential to all engaged in Insurance work that a few notes on the subject may be of interest to the members of this Institute; there may be a difference of opinion as to how far such knowledge should extend, but all will admit that an idea of the general principles is almost a necessity. Not being a lawyer by profession, the compiler of these notes noes not claim to speak with any special authority on legal matters, and has therefore endeavoured to leave severely alone those refinements and technicalities on which lawyers themselves do not agree. All legal matters should be referred by an Office to its legal adviser, who is appointed and paid for such duties, and the legal knowledge of the officials should be utilised rather to prevent the latter from falling into difficulties than to enable them to take upon themselves any of the duties of the former. It is he who should advise the Office as to the strict legal position and the rights it is entitled to. The Office may sometimes find that these rights may be waived without material risk, and that it is politic in particular cases to do so, and here especially some legal knowledge is necessary to enable the Office, to some extent, to gauge the risk it runs in dispensing with certain formalities. A further use of such knowledge on the part of officials is to enable them to educate, in some degree, that large mass of policy-holders and agents whose ideas on legal matters are of an extremely primitive nature. Difficulties, when they arise, are no doubt extremely annoying, and sometimes involve great expense and delay in rectifying the title. But they are also, to some degree, damaging to the Office; for however free the Office may be from blame it is extremely difficult to persuade an angry policy-holder that his troubles are of his own making. He, in most cases, thinks the Office is placing unnecessary obstacles in his way, and this opinion, however groundless it may be, cannot but be detrimental to the interests of the Office.

These notes are entirely confined to legal matters relating to policies of Life Assurance. The law relating thereto is not altogether applicable to other classes and descriptions of Insurance, and the time at the disposal of this meeting this evening will be fully filled in dealing with a few of the more common points relating to life policies.

The Nature of the Contract.

An assurance is a contract, the terms of which are set out in an instrument called a policy. Now, a fundamental principle of Insurance law is that the contract is one requiring the utmost good faith on both sides. Under this rule, a full and complete disclosure of all facts bearing on the risk is necessary; if the assured fails to make such disclosure he can claim no benefit from the contract, though if there be no question of fraud on his part he may, in the absence of a stipulation to the contrary, be entitled to a return of his premiums. A point to be noticed is that a full and fair disclosure is required from the proposer, not only to the questions in the proposal form, but also on all other matters within his knowledge which may be material to the risk. The questions in the proposal forms are now so skilfully drawn up that information is, in most cases, asked for on all material matters, but it must not be overlooked that the law is such that, should the questions not cover any material point, the proposer must disclose it.

Warranty.

At the end of a proposal form there is usually a declaration. The form of such declaration may vary; it may state that the answers to the questions are true and that the assured agrees that the proposal and declaration shall be the basis of the contract; in other words, the facts are stated to be warranted. A warranty precludes all disputes as to the materiality of the questions put. If a question has been wrongly answered it is no defence to state that the question was of no importance and should not have been asked, or that it was answered in good faith. A warranty—that is, an affirmative one—must be true, otherwise the contract cannot be enforced, notwithstanding the good faith of the assured. Such a strict declaration as that just given is in practice unnecessary and would not be conducive to the encouragement of insurance, and, moreover, it might press very heavily on *bona fide* assured persons. The form of declaration in use at the present time is consequently somewhat modified by the addition of such words as, "to the best of my knowledge and belief." A warranty in this form will be construed

less strictly than an absolute warranty, and, in the event of misstatement, the onus of proof that the proposer knew the facts will be on the Office. A proposer is obliged still to disclose all he knows that is material to the risk, and it is a question for a jury to decide what is material when its truth is not warranted.

Concealment.

Concealment is as fatal to the validity of the contract as an untrue warranty, and in this connection it may be pointed out that failure to answer a specific question, if the applicant knew the fact and was able to answer it, would amount to concealment. A clause in the policy making it void if the answers in the proposal, with the modified declarations now generally in use, should prove untrue, is to be construed as requiring nothing more than that the applicant should observe good faith towards the Office and make full, direct and honest answers to all questions without evasion, fraud, or concealment of fact.

Office can always have Contract annulled in case of Fraud.

We are all familiar with so-called indisputable policies. Such a description is open to criticism. It has been said that anything may be disputed, and this is no doubt to some extent true. There is a tradition, which may be founded on fact, that long ago an Office commenced business calling itself the Indisputable Assurance Company, or some similar title, and that it successfully disputed its first claim. Perhaps the Office did not deserve its temporary success, for the title probably attracted to it the fraudulent policy-holder. Matters are scarcely improved by transferring the title from the Office to the policy. It must be remembered that no Office would wish to dispute its claims—if unsuccessful it would be damaging, and if successful it would scarcely benefit its general business; it is only on the ground of fraud that the Office could hope to succeed in such an action, and neither by description nor by any other means is an Office able to contract itself out of its common law rights in this respect. Not only has an Office the right, but it may be that it is positively its duty to resist a claim in the case of fraud. The use of the word "indisputable" would seem, therefore, to place an Office in a false position should it at any time find it necessary to protect itself against imposition, or even to divert from a criminal his unlawful gains.

When a policy has been effected and death occurs, and the Office finds itself forced to dispute the claim, it matters not whether the

cause of death has any connection with the grounds of dispute. A very good instance occurred some few years ago in connection with policies on the life of Mr. Cecil Hambrough. Probably all will remember that Mr. Hambrough died from a gun-shot wound, and that there was a great deal of mystery connected with the case. On inquiry the Office which had issued large policies on the life found themselves compelled to refuse payment and an action was brought against them. The Office set up several lines of defence, but it was unnecessary to go into them all. The defence succeeded on the question of mis-statement and concealment in the proposal alone. The applicants had wilfully failed to disclose that other Offices had declined or postponed proposals made to them on the ground that at times albumen had been discovered. Although the cause of death had nothing whatever to do with this physical defect, the action to recover the policy moneys entirely failed.

Misrepresentation.

The law as to statements made directly or by reference in the proposal form is therefore clear; not so simple, however, is the law relating to statements made by way of representation only, and not forming the basis of the contract; but, speaking generally, any statement made to the Office or its agents by the proposer, or by some person for whom the proposer is responsible, even if only verbal, which may induce the Company to incur the risk, is binding on the proposer, although such statement may not be made the basis of the contract by direct reference. Wilful mis-statements on the question of health or family history, verbally made to the medical examiner, are misrepresentations to the Office, whose agent, for the purpose of the examination, he is. Again, if a man insures the life of another in which he has an insurable interest, he will be bound by any wilful mis-statement by the life assured made to induce the Office to grant the policy; the life assured, thus referred to for information, becomes thereby, for this purpose, the agent of the proposer, who will be bound by his statements. Representation of this nature is therefore a question of fact for the jury, and a defending Office, to rely on them, would have to prove that such statements were made on behalf of the proposer and that they induced the Office to accept the risk.

Of course, it is necessary that the Office should take action as soon as the true facts come to their knowledge; if they continue to receive premiums, or in any way recognise the contract afterwards, they will be assumed to have waived the forfeiture. Not only is

this so in cases of mis-statement or concealment, but also in case of any breach of the conditions of the policy.

Insurable Interest.

Life policies are contracts, not to indemnify, but to pay a certain sum on the happening of a particular event depending on the duration of human life. In this, Life policies differ from some other classes of assurance, such as Fire policies, which are essentially contracts of indemnity. A man is always assumed to have an insurable interest in his own life, and under the Married Women's Property Acts, 1870 and 1882, which will be referred to later, certain other insurable interests are provided for. Apart from these and the rights of parents, under the Friendly Societies Acts, to insure the lives of their children for strictly limited amounts, the law forbids one person to insure the life of another in the absence of insurable interest of a pecuniary character, and any insurance effected may only be to the extent of such interest. In practice, an Office, in the absence of any reason for suspecting want of good faith, accepts the statement of the assurer on this point without calling for proof; and this is all that is necessary, as such statement forms part of the basis of contract, which is voidable by reason of any wilful mis-statement. This condition of insurable interest applies only to the time when the contract is made. When once legally effected, the policy will not be affected by the determination of such interest before the happening of the event insured against.

Assignments.

A policy is not a negotiable instrument, and the legal title can only be transferred by assignment. Such assignment may be either by way of mortgage, sale, deed of gift, or to trustees for the purpose of trusts.

Mortgages.

Owing to the value of policies for mortgage purposes a sound general knowledge of the law of assignments by way of mortgages is of great importance. With a view to more clearly discussing this branch of the subject, it will be useful to take a brief historical survey of the law of mortgage. In olden times land was the principal form of property and subject of mortgages. Now, many other forms of property, which did not then exist, as, for example, policies of life assurance, may be mortgaged, and it is interesting to trace the development of the law from early times to the present day.

A mortgage may be defined as a conveyance of property as security for the payment of money. Originally, the conveyance by the borrower to the lender was on the condition that if, on a fixed

date, the sum borrowed should be repaid the lender would convey back the property. If repayment was not made on the exact date, owing to any cause or oversight, the property was absolutely forfeited and the Courts of Law would give no redress whatsoever. The lender became the absolute owner, and the borrower had no further right or title to it. This led to very great hardships in many cases, and during the reign of Queen Elizabeth a remedy arose. A Court of Chancery or equitable Court had by that time grown up by the side of the Courts of Law, but quite independent of them. The Court of Chancery had general jurisdiction to redress grievances which could not be remedied at Common Law. It was during this reign that a mortgagor, who had lost his property by failing to pay on the date appointed, obtained relief against the forfeiture he had incurred; and by the reign of Charles I. it was an established principle in equity that a mortgagor should be allowed to redeem his property after the date fixed for repayment had passed. By the reign of Charles II. the general jurisdiction of the Court of Chancery was exercisable in accordance with almost fixed rules. As regards redemption of mortgages these rules were: (i) The principle of the equity of redemption, *i.e.* the right of the mortgagor to redeem on application to the Court of Chancery, notwithstanding that the date for repayment had passed; (ii) the principle "Once a mortgage always a mortgage," *i.e.* a conveyance originally meant as a security shall be always considered in equity to be redeemable, even in spite of any express agreement to the contrary between the parties; (iii) the principle that the right of the mortgagee is only to the money lent, for which money the property is merely security. It will thus be seen that although in law the mortgagee was for all practical purposes the absolute owner, yet in equity he had only a charge on the property. The equity of redemption or right to redeem is what is called an equitable estate, that is, an estate recognised by the Court of Equity, while the mortgagee was in law the owner of the property, or owner of the legal estate.

Notwithstanding the alteration in the position of the mortgagor and mortgagee by the intervention of the principles of equity, the form of mortgage remained the same and is practically the same to this day. To alter the form would have been to alter the legal rights of the mortgagee, but equity modified these rights by giving equitable rights to the mortgagor. The Court of Chancery, however, could not act altogether in a one-sided manner, or the mortgagor would be unduly favoured; the Court had also to consider the

mortgagee. It would be very unfair to give an unlimited right to redeem, and to meet this the mortgagee was given the right to foreclose. If he could not obtain repayment after the date fixed on giving the necessary notice, he was enabled to bring an action against the mortgagor in the Court of Chancery. The Court would order an account to be taken of the amount due for principal, interest and costs, and the mortgagor was given a fixed time to pay, and, in default of payment, his equitable rights were barred, leaving the mortgagee in his legal position as absolute owner. Before 1881 a mortgage was a very long and cumbrous document. Its terms may be briefly summarised as follows: After stating the parties, the deed witnessed the payment of the principal and the receipt thereof by the mortgagor. The mortgagor then covenanted to repay on a fixed date, usually at the end of six months, though it was seldom intended that repayment should then be made. In reality it was only intended that any time after that date the mortgagee could call for his money if he so wished. After this covenant the property given as security was conveyed. Then followed the proviso for redemption, which stated that repayment should take place on a definite day—exactly as stated in the ancient deeds. The mortgagor covenanted for payment of interest, and gave the mortgagee the power to sue for interest without suing for principal. The next clause gave the mortgagee power to sell the property at any time in any way he liked, and to execute any deed conveying to a purchaser. This was too large a power and was modified by the following clause, providing that the power of sale should not be exercised unless the principal was not repaid within six months of the time it was demanded, or that interest was in arrear for a certain period. There were many other clauses and provisos which need not for the present purpose be referred to. Attention should be specially drawn to the fact that though in certain events the mortgagee had power to sell the property, he could not take it himself except under a foreclosure Order of the Court. The above will give an idea of the length and cumbersomeness of a mortgage deed before 1881, and the expense was considerable—in fact, proportionate to its length.

The modern mortgage deed differs from that in use before 1881, in that certain of these clauses need not be, and usually are not, inserted, but their inclusion is implied. In 1881 an Act came into force which is known as the "Conveyancing and Law of Property Act 1881." Under this Act, everyone who conveys property as "beneficial owner" is deemed to make certain covenants,

which include all those referred to in connection with the ordinary mortgage deed prior to 1881, and also many others that it is not here necessary to discuss. All are probably familiar with these magic words "beneficial owner," but it is not always realised that a person conveying as such is deemed in law by virtue of these words to have entered into a number of most binding engagements. It is most important, therefore, to see that these words are inserted in every mortgage deed, for if the property is so conveyed all the elaborate clauses, covenants for title, power of sale and many others, may be omitted.

It is unnecessary to give a common form of mortgage deed as often used at the present time; probably all are familiar with it. It may be quite short, but if all the powers implied in it were set out in full it might extend to 20 or more times the length. By virtue of the Act it contains more by implication than it expresses. Special clauses have still to be inserted to meet special cases, and the form varies somewhat according to the nature of the property in mortgage. The essential point of a legal mortgage is that the legal property passes to the mortgagee: he becomes the owner of it in law, subject to certain rights of the mortgagor to get his property back. If the legal right does not pass to the mortgagee, then the mortgagee's rights are only equitable and the mortgage is known as an equitable mortgage.

Now, an equitable mortgage can only be enforced by the equitable jurisdiction of the Courts. Such mortgages may be divided into three classes: (1) The mortgage of an equitable interest, such as an equity of redemption. (2) Imperfect transfers of property. (3) Deposit of documents of title, usually coupled with a memorandum of deposit. Of the first of these classes a second mortgage is a good example—the first mortgagee has the legal interest and the mortgagor is only able to give the second mortgagee an equitable interest. Of the second and third classes the following is an example. The borrower merely signs an agreement to execute a formal mortgage to the lender if called on to do so, and declares that in the meantime the property is charged with the debt. The borrower still owns the legal estate, but the lender has the right to go to the Court and demand that under its equitable jurisdiction it shall assist him either to make the borrower execute a legal mortgage, or grant such remedies as will enable him to recover the debt.

Excepting leaseholds, all personal property was formerly divided into two classes—choses in possession and choses in action. A chose

in possession is a thing of which you have the physical possession, such as a book, for example. A chose in action is a thing not actually in your possession, but which you have the right to obtain from another, such as a debt or money payable under a policy. Formerly, under the Common Law, choses in action were not assignable, and therefore could not be legally mortgaged. The law viewed a chose in action as a right to bring an action against another, and it was considered that the assignment of such right would encourage litigation. Now, this state of things was altered by the Judicature Act, 1873, under which an absolute assignment in writing, not purporting to be by way of charge only, of any legal chose in action, of which written notice shall have been given to the person from whom the assignor would have been entitled to claim, shall be effectual in law to transfer the legal right to such chose in action, from the date of such notice, to the assignee. The transfer, however, would be subject to all equities which would have been entitled to priority over the right of the assignee, if the Act had not been passed. It has been decided that a mortgage, in the ordinary form of an absolute conveyance with a proviso for redemption, is an absolute assignment for the purposes of the Act. The result of this Act was that a chose in action could be mortgaged by a deed in much the same form as land is mortgaged, but it is important to note that express notice in writing must be given. To advance money on mortgage of a chose in action, without giving written notice in proper form, places the lender in a most insecure position. In fact, he might almost as well make the advance on the borrower's note of hand. Another point to be specially noted is that the mortgagee takes the chose in action subject to all existing claims, whether he has had notice of them or not; and there is only one exception to this rule, and that is in the case of negotiable instruments which are not assigned but the legal interest in which passes by mere endorsement on delivery. Anyone taking a negotiable instrument *bona fide* and for value acquires a good title to it.

When Policies were first assignable.

Policies of assurance however, although choses in action, became assignable before the Judicature Act, 1873. They were especially legislated for by the Policies of Assurance Act, 1867, which provided that the assignee who gives notice to the Office may sue in his own name.

When the mortgagee effects the policy in his own name difficulties

may arise as to who is the owner. On this point it is sufficient to say that in the absence of any contract, express or implied, the grantee is presumed to be the owner, but that this presumption will not hold good if the debtor either pays the premium or is charged with them in account. This was settled in the Appeal Court, in 1892, in what is known as the Marquis of Northampton case. A loan was made, secured entirely on a contingent reversionary interest supported by contingent policies. The premiums and interest were advanced by the lending Office. The borrower charged his contingent reversion with principal, interest and premiums, and certain agreements were entered into by which if the borrower predeceased the life tenant without paying off the loan the policy was to belong absolutely to the Office in satisfaction of their debt. The contingency failed and the policy became a claim. An action was brought by the personal representatives of the borrower for the surplus policy moneys after payment of the debt, premiums and interest, and in spite of the agreement referred to it was decided by the House of Lords that the surplus belonged to the borrower's estate although he had not paid over any money. It was held that the transaction included a mortgage of the policy, and any attempt to prevent the mortgage from being redeemed must fail on the principle that "once a mortgage always a mortgage." Any agreement which endeavoured to prevent redemption would have no effect at law. It will be noticed that the borrower was charged in account with the premiums, which in fact were deducted, together with principal and interest, from the policy moneys, and this, of course, was equivalent to paying them. If the premiums had not been chargeable in account, the action to recover the balance of policy moneys would have failed.

Contributory Mortgages.

The amounts of advances on mortgage of policies are not usually so large that more than one party contributes to the advance, and I do not therefore propose to say anything on the subject of contributory mortgages, except to point out that care should be taken to protect the rights of each contributory; otherwise the mortgagees would be deemed by law to be joint tenants, and the benefit would pass to the survivor.

Having now briefly considered the principles relating to mortgages, I propose to refer to the position of the parties after the mortgage has been completed. First, it may be noted that anyone interested in the equity of redemption has the right to redeem—that is to say,

not only the mortgagor, but all subsequent mortgagees. The right to redeem on the date fixed for repayment is a legal one; after that day the right is an equitable one, only exercisable on six months' notice being given. This rule as to six months' notice does not apply to equitable mortgages by deposit—such mortgages are considered to be of the nature of temporary investments, and a mortgagee who has taken steps to enforce his claim is only entitled to interest up to the date of repayment.

Notice of Assignment.

When an assignment of a policy has been executed, it is most important that notice should be promptly served on the Company, and until this is done the assignment is incomplete. The notice must be served on the Company itself at head office, and an acknowledgment under the hand of an officer of the Company taken, for which a statutory fee not exceeding 5s. is payable. It is important to note that notice must be to the Company. Notice to an agent is insufficient to vest the legal title in the assignee. The Policies of Assurance Act, 1867, provides that the date on which such notice shall be received shall regulate the priority of all claims under any assignment, and this provision is not always understood. It is probable that the Act was framed for the protection of the Offices in case any *bona fide* act on their part was detrimental to an assignee who failed to give notice to the Office. It does not necessarily regulate the priority of assignees as between themselves, and a subsequent incumbrancer would not obtain priority by virtue of being first to give notice to the Office, if he had knowledge, at the time of making his advance, of the earlier charge.

Position when Mortgage repaid.

When a mortgage is repaid the mortgagee is in a fiduciary position; he is in a sense a trustee who is bound to surrender, that is, reconvey the property to the person entitled to demand it. If he has no notice of a prior claim the mortgagor is naturally the person to whom he would convey. If he has such notice he need not convey to the mortgagor, and the second mortgagee can insist, under the Conveyancing Act, 1882, on the first mortgagee assigning the first mortgage to any nominee of his. In the case of an equitable mortgage a receipt is all that is necessary on repayment. You will remember that in these cases no legal estate is conveyed, and there is consequently nothing to reconvey. If a policy is legally assigned and notice is given, the Office will treat it as the property of

the mortgagee until he has notice of a reassignment to the mortgagor.

Transfer of Mortgage.

Transfers of mortgage are common transactions, and a word of warning under this heading may be given. A mortgagee has always the right to transfer his mortgage to another, but it is most necessary that a transferee should see that the mortgagor either joins or has notice of the transfer, and the amount that the transferee understands to be owing must be stated to him. The reason for this will be readily seen when it is noted that the transferee takes the mortgage subject to the state of the account at the date of transfer. If the debt has been reduced or repaid the transferee will have no claim against the mortgagor for anything beyond the balance, if any, outstanding.

Remedies of Mortgagees—Foreclosure.

Now, let us next consider the remedies of the mortgagee and his method of enforcing them. The mortgagee, or those claiming through him, cannot, generally speaking, exercise their powers until default has been made in payment according to the agreement in the deed, usually six months from the date of the deed. One of the principal remedies of the mortgagee is to bring an action for foreclosure. After default in payment on the day fixed, and notwithstanding any power of sale the mortgagee may have, he may ask the Court to bar the equity of redemption—in other words, put an end to the equitable rights of the mortgagor. The mortgagor must be made a party to the action. An account is taken of what is due, including costs, and a certain time is allowed for the money to be found; if not found by the date fixed, an order absolute for foreclosure is made, which puts an end to all rights of the mortgagor, and also of subsequent encumbrancers. By foreclosure the mortgagee becomes absolute owner of the property, and must accept it in full discharge of his debt. He cannot have recourse to any other remedy, such as suing under the personal covenant of the mortgagor, without reopening the foreclosure. The Court may, however, on the request of the mortgagee, or mortgagor, or anyone claiming under the mortgagor, order the property to be sold. The proceeds of sale would, of course, be applied in paying off the incumbrances in their order, and the surplus, if any, would belong to the mortgagor. The right of foreclosure extends to equitable mortgages, but it is doubtful whether the mortgagee can demand an order for sale.

Suing on Personal Covenant— Power of Sale.

A second remedy is to sue the mortgagor on his personal covenant. Most mortgage deeds, you will remember, contain a personal covenant, but even if such covenant is wanting, the mortgagee can sue as an ordinary creditor, and in this connection it may be noted that the liability of the mortgagor under a covenant remains with him, and does not pass to any assignee of the equity of redemption. We now pass on to the remedies of the mortgagee under the Conveyancing Act, 1881. It will be noticed that the Act only gives these remedies to mortgagees by deed. The remedies and the powers given by the Act may be somewhat modified or made more onerous by the terms of the deed, though any such alteration is unusual. In the absence of any modification the mortgagee has the right to sell after moneys become due without going to the Court or consulting anyone, provided that he shall not sell unless and until (1) notice has been served on the mortgagor requiring payment of the mortgage money, and default has been made in payment, in whole or part, after such service, or (2) some interest is in arrear for two months after becoming due, or (3) there has been a breach of some provision, other than a covenant, for payment of principal or interest. A first mortgagee can sell the property free from all rights others may have, and a second mortgagee has always the right to sell subject only to the first mortgagee. A *bona fide* purchaser, buying under the mortgagee's power of sale under the Act without knowledge that the mortgagee is selling improperly, is quite safe. His title is perfectly good, and the mortgagor's remedy is against the mortgagee in damages. Of course, the mortgagee exercising a power of sale is obliged to honestly endeavour to obtain the best value, or he will be held responsible, and he must apply the proceeds in payment of the various claims, in order of priority, any balance going to the mortgagor.

Bankruptcy of Mortgagor.

We may now consider the position of a mortgagee when the mortgagor has been adjudicated bankrupt. In this case the following courses are open to the mortgagee under the Bankruptcy Act, 1883: 1. He may realise his security, and, if insufficient, prove for any balance of his debt as an ordinary creditor.

2. He may give up his security for the general benefit of creditors, and prove for the whole debt.

3. He may state in his proof particulars of his security and the value at which he assesses it, and prove for the balance.

In the last case, if the trustee is of opinion that the mortgagee has placed an insufficient value on his security, he can either take over the property, freed of the mortgage, at the valuation, or require the property to be sold, and the mortgagee can by notice in writing insist on the trustee electing which he will do, and, if the trustee does not give notice of his election within six months, the valuation will stand and the equity of redemption is barred.

Settlements—Voluntary.

Policies of assurance are frequently made the subject of settlements, either voluntarily or for consideration. A voluntary settlement becomes void under Section 47 of the Bankruptcy Act, 1883, if the settlor becomes bankrupt within two years, or within ten years, unless it can be shown that he was able at the time of making the settlement to pay all his debts without the aid of the settled property, and that the property passed to the trustee of the settlement at the time of execution. No express provision was made in the Act for the protection of a *bona fide* purchaser for value from a voluntary assignee, and difficulties have on several occasions arisen on this point. The interpretations in the Courts have been very contradictory, and even now the law in the case cannot be considered as definitely settled, as no case has been taken up to the House of Lords. A strong Court of Appeal in 1897 gave a unanimous decision which may fairly be accepted as an authoritative statement. Their decision was that a voluntary settlement was not void as against the trustee in bankruptcy of the settlor from the date of the settlement, but only from the time the title of the trustee accrued; so that the title of a *bona fide* purchaser, acquired prior to the bankruptcy of the settlor, would be good as against the trusteee. An Office would, therefore, be practically safe in accepting the title of a voluntary assignee, *bona fide* and for value, if it was ascertained the settlor was not already bankrupt. A further interesting point has been raised as to whether a voluntary settlement of a policy, which did not contain a covenant by the settlor for payment of future premiums, operated as a complete settlement of the policy moneys as from the date of the settlement, notwithstanding that the settlor continues to pay the premiums; or whether each payment in such a case was a new voluntary settlement liable to be set aside under the Bankruptcy Act within 10 years. The Queen's Bench Division decided that each payment was a voluntary settlement of so much of the policy moneys as it might be supposed to provide. This was a most impracticable decision, and fortunately

was overruled by the Court of Appeal, which decided that each premium was not a separate settlement and that when, as in the particular case before them, the original settlement had been executed more than 10 years before the bankruptcy, the trustee had no title to any of the policy moneys. An Office accepting the surrender of a policy is in the position of a *bona fide* purchaser for value, and as the law on this subject cannot be taken as authoritatively settled, no case having been decided by the House of Lords, an Office should not encourage a surrender within two years of the date of the settlement; and even after that date, not only should it be ascertained that the settlor is not bankrupt, but a statutory declaration may fairly be asked for in proof of the solvency of the settlor, without the aid of the settled property, at the date of the settlement.

For Valuable Consideration.

The most common form of settlement for valuable consideration that Insurance Offices are concerned with are ante-nuptial settlements. The powers of the trustees are usually defined, and, if payments are made by the Office in a manner not authorised by the deed, the Office may be held liable.

Married Women's Property Acts.

The Married Women's Property Acts have given rise to many difficulties. It will be remembered that the first Act was that of 1870, and the second that of 1882. The former Act was repealed by the latter, but not so as to affect any act done or right acquired while the former Act was in force, and the Act does not extend to Scotland, which has its own Acts of 1877 and 1880.

Both Acts, those of 1870 and 1882, provide that a married woman may effect a policy upon her own life or the life of her husband for her separate use, but the 1870 Act required that it should be expressed on the face of it that it is so effected. The 1870 Act also provides that a married man may insure his own life for the benefit of his wife, or wife and children, or any of them, and that such property shall be deemed a trust for their benefit, and shall not, so long as any object of the trust remains, be subject to the control of the husband or his creditors. It also provides for the appointment of a trustee by application to certain courts, and that the receipt of the trustee shall be a good discharge to the Office. It also enacts that if the policy was effected with intent to defraud creditors, they shall be entitled, out of the sum assured, to an amount equal to the premiums so paid.

The 1882 Act gives somewhat larger powers, and also enables a woman to insure her own life for the benefit of her husband and children or any of them. A similar provision for the protection of creditors is inserted, but the most important point of difference in the two Acts is the provision for the appointment of trustees. The latter Act gives the assured power by any memorandum under hand to appoint or make provision for such appointment and for the investment of the policy moneys. In default of any such appointment the policy immediately on its being effected vests in the assured or his or her personal representatives in trust for the purposes named. If no appointment of a trustee or trustees is made, or no notice is given to the Office, on a claim arising the legal personal representatives can give the Office a good discharge for the policy moneys. Application is often made to an Office to take a surrender of a policy or bonuses on a policy effected under the Acts. It has been held by some that in the case of a policy under the 1882 Act, the Office is safe in taking the discharge of the husband, in default of notice of the appointment of a trustee, as he is in such case a trustee under the Act, and that any redress in consequence of improper surrender would be against him. It would, however, be scarcely prudent to take his receipt alone, but probably no risk would be run in taking the joint receipt of husband and wife, if she was the only beneficiary. When children are also included, and they are under age, a surrender should be refused, and even if the children are of age and willing to join, the possibility of further issue must not be lost sight of. In practice, policies under the 1870 Act, when no trustee has been appointed, are treated in a similar manner, but as the Act does not vest the policy in the assured the discharge is not so satisfactory.

Stamps.

The question of Stamp duties is an important one. In the case of a mortgage under seal, which, as has been pointed out, reaps the benefits of the Conveyancing Act, an *ad valorem* stamp of 2s. 6d. per cent. is required, but an equitable mortgage under hand only is subject to a stamp of 1s. per cent. only. If, however, the deed is so drawn as to place the equitable mortgagee in as good, or nearly as good a position as in the case of a legal mortgagee, by giving him the powers of sale conferred by the Conveyancing Act, the ordinary mortgage duty will be payable.

It is important to note that when the equity of redemption of a policy which is already in mortgage is purchased by the mortgagee,

the full consideration money, *i.e.*, the amount on mortgage, together with any balance which may be paid for the equity, is subject to a stamp of 10s. per cent., and it is not even permissible to set off the mortgage stamp of 2s. 6d. per cent. already paid on that portion represented by the mortgage. The Customs and Inland Revenue Act, 1888, places Insurance Offices somewhat in the position of detectives for Inland Revenue. It enacts that no assignment is to confer on the assignee or his representatives any right to sue for the moneys assured or power to give a valid discharge for such moneys unless such assignment is duly stamped, and no payment is to be made under an unstamped assignment, and that, if any such payment is made, the stamp duty, together with the penalty, is to be a debt from the Office or person making such payment. It further provides that any indemnity against a claim in consequence of the insufficiency or absence of stamp shall be void. This enactment is somewhat unfortunate from the point of view of the Office. It makes it very important in the case of a defective title that the Office should be satisfied that any deed not forthcoming is really lost, and not stated to be lost because insufficiently stamped. A statutory declaration should always be taken as to the loss, and it should, in all cases where the missing deed forms a direct link in the chain of title, be stated therein that the deed was sufficiently stamped. The Act refers to assignments actually executed, notice of which has been given to the Office, and does not refer to defects in title owing to the absence of a re-assignment. Bearing on this point the question arises whether a notice once given may be cancelled. Cases have arisen where notices have been withdrawn because the deed has not been stamped within the time allowed, and a fresh deed has been executed of which notice is given. This is an evasion of the Act, and the proper course is to have the original deed stamped and the penalty paid; the unstamped deed is not void but only imperfect until stamped, and the Office cannot without risk allow the withdrawal. When a re-assignment has never been executed, and the assignment is by deed, a formal re-assignment should be called for, but if the amount is small the Office might be willing to pay on the joint discharge of both mortgagee and mortgagor or his representatives. If the mortgage is an equitable one, a letter from the mortgagee, stating that he has now no claim on the policy, is sufficient, and the discharge of the mortgagor is all that would be necessary.

Receipts for Policy Moneys.

A receipt on a policy requires a 1d. stamp, but if it contains an indemnity clause or a declaration that it is given in discharge of all claims, it should in addition bear a sixpenny stamp as an agreement, or a 10s. stamp if such discharge is under seal. The receipt would be good as it stands, but the agreement portion would not be admissible as evidence until stamped. A receipt for prinicpal and interest on a properly stamped mortgage deed does not require a stamp, but if words such as "in full discharge" are added it will require stamping as a re-conveyance. All deeds connected with policies issued in the United Kingdom and payable here require stamping in accordance with the Stamp Act 1891, but may be stamped without penalty within 30 days of arrival in this country.

Payment to Mortgagees of Policy Moneys.

If a claim for moneys is made by the mortgagee, payment may be made to him under Section 22 of the Conveyancing Act 1881. As a matter of practice, notice of the payment is usually given to the mortgagor or his representatives, but it is not strictly necessary to do so. This section is not limited to mortgages by deed alone, and would apply to equitable mortgages, though it is the usual practice to take the signature of the mortgagor or his representatives in such cases.

Surrender by Mortgagees.

When the surrender of a policy or bonuses is applied for by a mortgagee under seal, he must state that he is surrendering in exercise of his power of sale conferred by the Act, and further enquiry by the Office into the default which has given rise to the exercise of the power is unnecessary. When the mortgage is under hand only, the concurrence of the mortgagor is necessary, in the absence of any express powers of sale conferred by the document.

Bankruptcy of Grantee.

Earlier in this paper the position of a mortgagee in the event of the bankruptcy of the mortgagor has been dealt with. It is now necessary to refer to the case of the bankruptcy of the grantee of an unassigned policy. On the policy-holder being adjudicated a bankrupt the policy immediately vests in the Official Receiver, and remains so vested until the appointment of a trustee. Notice must be given to the Office, as bankruptcy is not notice to the world. An Official Receiver rarely realises a policy, but, should he do so, his title would consist of the adjudication order and order for summary administration, and his receipt would be a good discharge to the

Office. It is the trustee who usually realises, and he should produce the order of adjudication and the Board of Trade certificate of his appointment.

Assignment for benefit of Creditors.

When a policy-holder assigns his property to a trustee for the benefit of his creditors, as a private arrangement not under the sanction of the Court, such an assignment is an act of bankruptcy, and any creditor not concurring may have the assignor adjudged a bankrupt. If the trustee under such a deed claims payment, it is impossible to acknowledge his claim for three months from the date of the deed, since a bankruptcy petition can be made within that period, in which event the title of the trustee in bankruptcy will relate back to the first act of bankruptcy committed within the three months prior to the date of the presentation of the petition. Such an assignment has to be registered as a bill of sale, and has to be stamped 2s. 6d. as such, and also 1s. per cent. on the value of the property conveyed.

Administration of Estate in Bankruptcy.

If the policy-holder is insolvent at the time of his death, the Court may order the estate to be administered in bankruptcy, in which case, if the Office has notice, payment will be made to the trustee and not to the personal representatives.

Defective Titles.

The difficulties in connection with defective titles are often very great, and it has frequently to be considered how far an Office can go without material risk in making payments under them. One of the commonest defects is the loss or destruction of deeds of which the Office has had formal notice. When a mortgage is repaid the mortgagor considers the transaction at an end, and forthwith often destroys the deed. Some years afterwards, may be, when the mortgagee has been lost sight of, the Office is asked to make a payment on a claim arising.

Payment into Court.

In such case the Office might safely pay into Court under the Life Assurance Companies (Payment into Court) Act 1896. Under this Act, if, in the opinion of the directors, there is a defect in title, and there is an uncertainty whether the Office can obtain a good discharge, payment may be made into Court and the discharge of the Court will be good. The full amount must be paid without deduction for costs or expenses, and the Office must pay interest or costs if the Court considers that it should do so, in consequence of

having paid into Court unnecessarily. If any action is pending, payment into Court can only be made by permission of the judge. An Office, however, would not care to put the claimant to the expense and delay if it could see its way to get over the difficulty without material risk. If there is no reason to suspect that the claim is other than *bona fide*, and the policy can be produced and the title otherwise is in order, a statutory declaration would usually be accepted.

Lost Policy. Perhaps the next most common defect in title is the loss of the policy itself. Lost policies are an endless source of difficulty. We are probably all familiar with the letter which states that the policy has been lost, and the writer would be so much obliged if the Office will kindly send him another. Unfortunately, the difficulty cannot be quite so easily settled. Experience shows that lost policies have a wonderful power of resurrection, and it is very desirable, when possible, to give them time to exercise this power, noting, of course, all particulars of the alleged loss or destruction in the register. Delay, however, is not always possible, owing to some dealing with the policy.

It has been decided that possession of a document is not essential for the purpose of constituting a legal title to it. When a claim is made by the executors of the assured, and there is no reason to suspect that there have been dealings with the policy without notice to the Office, a statement should be made by the claimants that a thorough search for the missing policy has been made, and that they are unaware of any dealings with it by the assured. Payment may then be safely made under an indemnity, properly stamped, against all losses, expenses, claims and demands that the Office may incur in consequence of its non-production. When an application for surrender of the policy or a loan thereon is made, the case is not so simple, but even then it would not appear that any appreciable risk would be run in treating the assured as owner, subject to a similar statutory declaration and indemnity as in the case of a claim, though some Offices refuse surrenders under lost policies. In the case of a total surrender, payment after all right of revival has lapsed is perhaps the simplest method of settlement, but proper indemnities may fairly be asked for. The risks run under these precautions would be small, because if the policy has been dealt with the holder is guilty of negligence in not giving notice to the Office, and consequently the title of the Office will be preferred to that of the assignee.

Except in the rare case of positive proof of the destruction of a policy, such as the production of charred remains after a fire, the issue of a duplicate should never be sanctioned. An Office would incur considerable responsibility should two policies be in the hands of different parties. The utmost that might be granted would be a copy which should be marked as such, and should state that its possession confers no rights whatever on the holder.

Agency.

The responsibility of an Office for the acts of its agents is a very difficult question. If an agent goes beyond his authority the Office is placed in a very awkward position, though the Office may be only strictly bound to the extent of the agency or delegated power. The scope of such authority is very difficult to define, and the Office has also to consider how far it is politic to repudiate the unauthorised acts of its agents. It is well, therefore, to impress on all agents the necessity of exercising care in strictly keeping within their delegated powers, and referring all other questions to the head Office.

W. P. PHELPS, M.A., F.I.A.

Insurance Institute of Yorkshire,
November 24, 1902.

EXAMINATION PAPERS—1903.

FIRE BRANCH.

PART I., SUBJECT A.—POLICY DRAFTING (TANNERIES TARIFF).

(*One hour and a half allowed for this Paper.*)

N.B.—Printed Warranties and Scale of Allowances must be used.

DESCRIPTION.

Trent Tannery, situate Nottingham, owned and occupied by W. JAMES & SONS, Tanners and Curriers.

No. on Plan.	Number of Storeys.		Rate.	REFERENCE.
1	5	Normal, 5/- Height, 2/- Currying, 2/6 Dubbin, 1/- Grinding, 2/- Construct'n, 1/- 13/6 Leather, &c., in Tan Pits, 6/9	13/6 6/9	1st.—Tan pits and store for tanning materials, containing a bark mill (no disintegrator used) and a small motor enclosed in iron case; part as leather drying store by steam pipes (a small air propeller therein). 2nd.—Skin splitting shop (machines worked by said motor); part stock room, dye house, pure shop, and press shop. 3rd.—Rounding, shaving, and whitening; dubbin made in steam-heated jacket pans. 4th.—Finishing shop, drum rooms (two gas iron heaters), blacking room (ink and logwood used for blacking). 5th.—Part as store, part louvre-boarded for natural drying.
2	1	Normal, 2/6	2/6	1st.—Warehouse for rough leather; part as offices having common fires (20 yards from all surrounding buildings).
3	1	Ditto, 5/-	5/-	1st.—Engine and dynamo house and press shop, feeding vats therein; oiled leather hanging and heating-off room by steam, adjoining but not communicating with No. 1.

[*Continued.*

No. on Plan.	Number of Storeys.		Rate.	Reference.
4	1	Normal, 5/-	5/-	1st.—Boiler-house communicating with No. 3, part firing place; the boiler covered with coating of asbestos.
5	1	Rate the same as No. 1.	13/6 6/9	1st.—Tan and lime pits shed, for pulling and tumbling; communicating with No. 1.
6	2	Normal, 5/- Height, /6 Spirit, 7/6 13/-	13/-	1st.—Skiver warehouse, glazing, sorting, and fluffing rooms, and crust oil leather warehouse. 2nd.—Ground shop and leather drying by steam and atmospheric air. A process of degreasing by petroleum spirit carried on. Distant 10 yards from surrounding buildings.
			5/-	Bark stored in open. Subject to average.

Aforesaid buildings are all brick built and slated or tiled, except as stated, heated by steam power, with the exception of the offices, and worked by a motor and said engine; lighted by electricity.

Fire plugs, hose, buckets, and extincteurs as per scale, making an allowance of 15°/₀ discount.

Printed Warranties to be attached.

NUMBERS ON PLAN AND AMOUNTS.

	1 and 5	2	3	4	6	In open.	Total.
	£	£	£	£	£	£	£
Building, ...	6,050	390	170	200	440	—	7,250
Machinery, ...	2,000	—	350	—	225	—	2,575
Motor, ...	75	—	—	—	—	—	75
Steam Engine, ...	—	—	200	—	—	—	200
Boilers, ...	—	—	—	180	—	—	180
Stock-in-Trade, ...	4,875	1,500	250	—	750	—	7,375
Stock-in-Trust, ...	—	800	—	—	—	—	800
Leather in Pits, ...	575	—	—	—	—	—	575
Liquor in Pits, ..	390	—	—	—	—	—	390
On Office Furniture and Fittings, ...	—	120	—	—	—	—	120
On Bark, ...	—	—	—	—	—	200	200
£	13,965	2,810	970	380	1,415	200	19,740

Draft a Policy and make out the Annual Premium.

FIRE BRANCH.

PART I., SUBJECT A.—POLICY DRAFTING AND ENDORSEMENTS (WOOLLEN MILLS).

(*One hour and a half allowed for this Paper.*)

N.B.—Printed Warranties and Scale of Allowances must be used and attached to the Draft.

Prepare Policy wording and premium for the following:—

Troutbeck Mill, Batley, owned and occupied by
JOHN SYKES & SONS, Limited, Carpet and Rug Manufacturers.

No. 1.—5 Storeys.

1st. Scribbling and Carding; part Office; and part fireproof, communicating by double iron doors, contains a rag machine for own use only.

2nd. Mule spinning; part fireproof, communicating by double iron doors, occupied for willeying.

3rd. Mule spinning.

4th. Weaving.

5th. Weaving, Winding and Warping.

No. 2.—1 Storey.

Boiler-house, no drying, communicating with Mill by single iron door.

No. 3.—3 Storeys.

1st. Ballooning.

2nd. Weaving, Warping and Beaming.

3rd. Jacquard Weaving.

Bought waste, added cotton up to 50°/₀, and cotton warps are used. Black oil used (45°/₀ unsaponifiable), but no mineral or seed oil.

The 3rd of No. 3 is occupied by Wm. Crouchley, remainder by Insured. Wood stairs through floors of No. 3.

Appliances:—Stationary Fire Engine, Fire Plugs in yard, and Buckets to scale. Nos. 1 and 2 sprinklered (any approved pattern). Town's main and tank supplies, 6-inch connection.

Amounts.

	Building, &c.	Machinery, &c.	Stock, &c.	Office Furniture.	Boilers, &c.
No. 1*	£3,000	£1,750	£1,200	£50	—
No. 2	100	—	—	—	£100
No. 3	800	600	500	—	—

* Excluding fireproof portions.

Rates.

Nos. 1 and 2.				No. 3.	
Normal,	10/-	Fireproof Rag Grinding Place—		Normal,	4/-
Height,	1/-	Normal,	63/-	Warps,	1/-
Boiler,	1/-	Oil,	7/6	Tenants,	2/-
Willeying,	4/-	Fireproof Willey House—		Jacquard Looms,	1/-
Materials,	10/-	Normal,	31/6		
Cotton,	7/6	Materials,	10/-		
Oil,	7/6	Cotton,	7/6		
		Oil,	7/6		

Nos. 1 and 2, less 45°/₀; No. 3, less 15°/₀, for appliances.

Endorsement.

Prepare an endorsement transferring 10°/₀ of the amount on building of No. 1 to the fireproof portions (in equal proportions); £100 and £250 of machinery in No. 1 to Rag Grinding Room and Willey House respectively; and £150 from stock in No. 1 to put £50 on stock in Rag Grinding, and £100 in Willey House; also allowing night work in No. 1 for three months (extra rate for night work, 5/-°/₀ per annum).

FIRE BRANCH.

PART I., SUBJECT B.—RE-INSURANCES.

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. What is the usually accepted difference between a Re-Insurance and a Guarantee?
2. What is the foundation of a Guarantee?
3. What rule governs the request of a Guarantee?
4. State the restrictions applying to Sub-Guarantees.
5. In what form is the acceptance of a Guarantee to be given?
6. Does this rule prejudice the effect of interim requests and acceptances between Offices?
7. What exceptions are there to a Guarantee acceptance being deemed absolute:—
   (*a*) As far as the take note is concerned?
   (*b*) Regarding an acceptance being given by a District Agent or Branch Official?
8. When is it understood that cover is given by the Guaranteeing Office?
9. Give the date of the commencing liability of the Guaranteeing Office.
10. Give the exception to No. 9.
11. What is necessary to ensure the validity of a notice relating to a Guarantee, and give the recommendation in connection therewith?
12. Give the particulars as to the furnishing of Renewal Lists.

FIRE BRANCH.

PART I., SUBJECT C.—GENERAL RULES FOR THE REGULATION OF FIRE INSURANCE BUSINESS.

(*One hour allowed for this Paper.*)

QUESTIONS

1. Under what conditions may a Policy be issued for less than twelve months, not charging short period rates?
2. What regulations are required to be observed when lighting by spirit or oil vapour is allowed?

3. How would you calculate the Commission on a Tariff risk (where the Commission is limited to 10°/$_o$ on the Tariff rate), rated at say 10/-°/$_o$, but on which you carry a special rate of 15/-°/$_o$?

4. As a rule no portion of the premium paid for Insurance for any period not exceeding one year may be returned or refunded, but under what circumstances is this rule waived?

5. Define a perfect party-wall.

6. What openings are allowed by the Rules through a floor or floors without extra charge?

7. State what are considered hazardous goods under the general rules.

8. State what are considered hazardous trades under the general rules.

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS (TANNERIES).

(*One hour allowed for this Paper.*)

QUESTIONS.

1. What Tanneries in England are excluded from the England, Wales, and Ireland Tanneries Tariff?

2. Which items of the general specification No. 1 are to be made subject to the Condition of Average?

3. What special rule in regard to agents' commission attaches to this Tariff?

4. Give and define the two normal rates for warehouses and offices.

5. Give normal rate for all other buildings.

6. Should a building having wooden louvre windows be charged for "defective construction," and, if so, how much?

7. State what you know about the currying process, and give the additional rate chargeable where such process is carried on.

8. What are the extra rates chargeable where dubbin, wax, and similar materials are made, prepared, or melted?

9. Describe the general methods by which leather is dried, and the rates chargeable in each case.

10. If bark or other tanning material be ground, what extra rates are chargeable?

11. Describe the basis upon which the contents of tan and lime pits are rated.

12. What discount may be allowed for extinguishing appliances?

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS (WOOLLEN MILLS).

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. To what buildings does this Tariff apply?
2. For the purposes of this Tariff, give the definition of a shed.
3. What is the extra charge for night work in: (*a*) a carding and spinning mill; (*b*) a weaving shed; (*c*) a drying room?
4. Define a fireproof mill.
5. How is the rating of the mill affected: (*a*) if it has a wooden flooring not laid on a fireproof floor; (*b*) if there be any communication by hoist (of brick or stone) or other opening through any floor or floors unprotected by iron or metal-covered doors?
6. Give the additional rate if any process of willeying or any substitute for willeying previous to scribbling, or any cleaning of waste made before scribbling be carried on (exclusive of wool scouring or washing) in a non-fireproof compartment in the mill.
7. What are the additional rates applicable to a non-fireproof carding mill for: (*a*) garnetting Insured's own waste containing cotton; (*b*) added cotton from 25°/$_o$ to 50°/$_o$ in a blend; (*c*) burring; (*d*) suspended sheets of combustible material?
8. What extra is charged for a mill of four floors in height?
9. Write out the "Waste" warranty, except Worsted Mills (Scotland).
10. State briefly the regulations as to communicating buildings.
11. Give in detail the rate for a stone and slated building of two storeys, in single tenure for spinning (no mixtures containing vegetable fibre spun) and weaving in plain looms (cotton warps used), wooden stairs through floor, and approved incandescent gas lights used.
12. Give the normal rate for a rag-grinding mill or shed of one storey, and containing only three machines.
13. Write out the two Warranties in the Form of Specification (relating to bi-sulphide of carbon, and camel's hair, etc., bags) which each policy issued under this Tariff should contain.

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS (CORN MILLS No. 2 TARIFF. ENGLAND AND WALES).

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. To what Corn Mills and buildings in connection therewith does the No. 2 Tariff apply?
2. Does this Tariff apply to rice mills, and if so, what are the rates to be charged?
3. What length of working line of roller contact, and what number of pairs of discs, are equivalent to one pair of stones?
4. In rating a mill, how would you treat a Dismembrator, a Schrot Machine, and a Bamford's Patent Grinding Mill?
5. What is the additional charge for a steam boiler in a non-fireproof compartment on ground floor of a mill, the chimney shaft passing through the floors of the mill?
6. What is the additional charge if the grain elevators are driven directly by chain or rope, or by shafting without intervening belting between such shafting and the elevator heads, and if six elevators are driven by one strap or belt?
7. What is the extra rate if a mill has, in addition to other grinding machinery, one Askham Tiger Mill (working on grain) and one disintegrator (working on flour produce)?
8. How should the feed spouts to the wheat cleaning machines be protected to exempt the mill from an additional charge?
9. What extra charge is made for a wheat separator?
10. (*a*) In the case of a wheat cleaning house adjoining and communicating with a mill by double fireproof doors, what extra charge is made in the mill rate? (*b*) If, however, the wheat cleaning house adjoins, but does not communicate with the mill except by spouts (fitted in accordance with Tariff requirements), and there is a window in the mill 12 feet from a window in the wheat cleaning house, is any extra rate chargeable, and if so, what?
11. When is a spout deemed a communication under this Tariff?
12. What is the extra charge for a mill having therein two single and two double purifiers not collecting their own dust?
13. What additional charge is made for a wooden stive room used only in connection with the purifiers and rollers?
14. State the rate for a small brick and slate four-storey mill having therein thirteen sets of rollers (with 260 inches of working line of contact), one Eureka Smutter, one Brush Machine, and four wire flour-dressing machines?

15. What is the charge (and how made up) for a steam corn mill built of brick and tile, six storeys and attic in height (no basement), lighted by electricity, containing two pairs of stones, ten sets of rollers (having roller contact = 596 inches), two pairs of discs having plain surfaces, and an Albion Grinding Mill, one Askham Tiger Mill (for grain), the main shaft being horizontal but from which an upright shaft runs from bottom to top of mill for driving the stones, the wheat cleaning machines (three vertical brush and three horizontal Eureka machines, all protected with magnets) being in a fireproof compartment on first floor of mill and only communicating therewith by double fireproof doors, four middlings purifiers collecting own dust, and two double purifiers not collecting own dust, two wooden stive rooms in connection with stones, rollers and purifiers, and three independent fans?

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS (CORN MILLS TARIFF, SCOTLAND).

(One hour and a half allowed for this Paper.)

QUESTIONS.

1. To what risks does this Tariff apply?
2. Under the term Corn Mills, what buildings are to be included?
3. What is the annual rate per cent. for a building in which grain (including peas or beans) is ground, crushed, bruised, or otherwise reduced solely for the production of food for cattle, by means only of one pair of stones, or their equivalent?
4. Under the term Rice Mills, what risks are to be included?
5. When is a spout deemed a communication under this Tariff?
6. What is the extra charge if any part of the external walls of a mill be of timber, and the roof of thatch?
7. What is the extra charge for a steam boiler in a building outside the mill, communicating otherwise than by a fireproof door?
8. What is the additional rate if drying of grain be done in the mill by hot air from a furnace outside, the building containing such furnace adjoining but not communicating with the mill?
9. In rating a mill, how would you treat an "Albion" Grinding Mill?
10. How is an Askham's Patent "Tiger" Mill chargeable?

11. Under what conditions is a smut house on corn mill premises allowed without an additional charge?

12. What is the extra rate for a stive room used in connection with rollers and purifiers?

13. How should two mills adjoining each other and separated by party walls carried through the roof, all communications being protected by double fireproof doors, be rated?

14. What is the rate, and how arrived at, for a corn mill built of brick and corrugated iron and roofed with slate, four storeys and attic in height, worked both day and night, containing four pairs of stones (two pairs not bedded in metal for grist purposes, and two pairs for shelling oats), an Askham's Tiger Mill and six sets of rollers, a smutter and a stive room in a fireproof compartment on first floor of mill (communicating only by double fireproof doors), the stive room being in connection with both stones and rollers, and drying of grain done by steam pipes only therein. The boilers being in a brick and slated building adjoining and freely communicating with the mill?

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS (CORN MILLS, IRELAND).

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. To what Mills and other buildings does this Tariff apply?

2. How are rice mills to be rated?

3. In mixed mills, how many pairs of stones, sets of rollers, and pairs of discs are deemed equivalent, and to what must the combination be equal before the additional rates under Item 6 of the Tariff apply?

4. In rating a mill how would you treat a dismembrator, a Schrot Machine, and a Bamford's Patent Grinding Mill?

5. What is the additional charge for a steam boiler in a non-fireproof compartment on ground floor of a mill?

6. What additional charge would be made for two kilns, which communicate with a mill by single fireproof doors?

7. What is the extra rate if a mill has, in addition to other grinding machinery, one Askham Tiger Mill and one disintegrator?

8. What is the charge, if any, for steam-heated air applied by means of a fan to a wheat drying apparatus used in connection with the wheat cleaning process?

9. What extra charge is made for a wheat separator?

10a. In case of a wheat cleaning house adjoining and communicating with a mill by double fireproof doors, what extra charge, if any, is made in the mill rate?

10b. If a mill has a wheat cleaning house, adjoining, but not communicating therewith except by spouts (fitted in accordance with the Tariff requirements), and there is a window in the mill overlooking and 10 feet from the roof of the wheat cleaning house, is any extra charge chargeable, and if so, what?

11. When is a shoot or spout deemed a communication under this Tariff?

12. What is the rate for an exhaust room outside a mill and not communicating therewith, and under what circumstances can the exhaust room be allowed without any addition to the mill rate?

13. What proportion of the difference between the water and other power mill rates should be charged in the case of a mill worked by water only ten months in the year, and by steam and water conjointly for the remaining period?

14. What is the rate chargeable for a warehouse which adjoins a smut room and communicates therewith by a fireproof door, the separation being otherwise perfect?

15. What is the rate for each of the following buildings, and how is the mill rate made up?

(*a*) Corn mill, brick and timber built and slated, worked by water and occasionally (not exceeding three months in the year) by steam as an auxiliary; four storeys and attic in height, containing three pairs of stones (one pair being used for shelling oats), ten sets of rollers, an Albion Grinding Mill, and a wood and canvas stive room.

(*b*) Brick-built and slated, communicating with the mill by double fireproof doors and containing a Barnard's horizontal oat-clipper.

(*c*) Warehouse, brick-built and slated, adjoining (*b*), and separated therefrom by a proper party wall through and above the roof, having no opening therein.

(*d*) Boiler-house, brick-built, with corrugated iron roof, adjoining and communicating with the mill otherwise than by a fireproof door.

FIRE BRANCH.

PART II., SUBJECT B.—PROCESSES OF MANUFACTURE (TANNERIES).

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. From the skins of what animals are the following obtained:— (*a*) imitation chamois leather, (*b*) saddlery leather, (*c*) butts, (*d*) bookbinding leather, (*e*) morocco leather, (*f*) boot uppers?

2. Explain, briefly, the changes which a hide would undergo before reaching the tanning pits, and by what processes these changes would be effected.

3. Name some of the vegetable materials most commonly employed in the processes of a Tannery, and state, briefly, what you know about each.

4. Describe the treatment of hides in the tanning pits, and state how long the treatment usually lasts.

5. Describe the methods of drying leather, and state what temperatures are usually maintained.

6. Describe the process of currying.

7. What is the difference, from an Insurance point of view, between the kinds of grinding mills which may be used in connection with a Tannery?

8. A Tanner, of whose Tannery you know nothing, asks you for some practical suggestions with a view to minimising fire risk.

9. What is a Fellmonger?

10. Name the principal Tannery localities in England?

FIRE BRANCH.

PART II., SUBJECT B.—PROCESSES OF MANUFACTURE (CORN MILLS).

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. "The production of flour is divided into five systems, each separate, but dependent upon the others, viz.:—" Briefly enumerate and define these systems.

2. What are the following:—Bran, dunst, cockle, chop, and pollard?

3. What cleaning systems would you like to find in a large mill grinding foreign or impure wheat? Name the order in which the machines are used.

4. What are the features of a model dust room? The answer may be illustrated by a diagram.

5. (*a*) What is a dismembrator? (*b*) What is a centrifugal dressing machine?

6. (*a*) Name three of the most hazardous processes in corn mills, and the chief feature of fire risk in each process. (*b*) Name three other prolific causes of fires.

7. Rollers are of various kinds—(*a*) break, (*b*) smooth chilled, (*c*) scratch, and (*d*) porcelain. For what purpose is each used? Under what circumstances may fire hazard be apprehended?

8. Define very briefly (*a*) Archimedean screw, (*b*) boulting cloth, (*c*) bunting, (*d*) hopper.

9. Mention the chief dangers, and necessary precautions, in the artificial lighting of mills.

10. Describe a Cyclone Dust Collector. When collecting fine dust from, say, roller exhausts or purifiers, it possesses a certain risk. Name this.

FIRE BRANCH.

PART II., SUBJECT D.—CORRESPONDENCE.

(*Two hours allowed for this Paper.*)

QUESTIONS.

1. A lady claiming £10 for a variety of articles burnt is awarded £7 odd. In reference thereto she writes the Secretary of the Company, "I am informed that it is your special business on "behalf of the Company to reduce everything damaged or "destroyed to the lowest value. That being so I cannot expect "to be treated different to others. I therefore think it better to "have something made good than to have nothing at all, so will "accept your offer." Reply.

2. Write to a stranger, A. B., who from his position and profession is likely to make a good Agent, inviting him to become a representative.

3. Write to an unimportant Agent who is always wanting supplies of stationery, in reply to his repeated request.

4. An Insurer, who has made no previous intimation of removal, advises that he has had a van load of furniture partially destroyed by fire whilst in transit on the high road, and claims £50 damage. Reply.

5. Write a letter to Head Office descriptive of the general effect of a new Tariff doubling the rates of the principal industry in your district.

6. A country Agent newly appointed desires a list of rates for his guidance, and to know whether the Company allow expense of conveyance hire in calling round upon farmers. Reply.

FIRE BRANCH.

PART II., SUBJECT E.—PLAN DRAWING.

(*Two hours allowed for this Subject.*)

INSTRUCTIONS.

Draw to a Scale of 40 feet to the inch.

The measurements thus <··················· 45················· > denote feet.

All party walls pass through roofs, unless otherwise described.

Doorways are indicated by crosses————————×——————

No. 1. Communicates by four windows, each protected by double fireproof shutters, with No. 2. The doorway to No. 2 is protected by double fireproof doors, and the doorway to the staircase in No. 6 by a single fireproof door.

No. 2. The part marked (*a*) of this building is a fireproof compartment on the ground floor entered at the point *x* through a fireproof compartment 10 ft. by 5 ft., with a fireproof door at each end. The building communicating with No. 2, marked H, is an outside stone staircase 15 ft. square, with brick-built hoist in the centre.

No. 3. The parts (*a*) and (*b*) are partitioned off with timber. The part (*b*) communicates by two windows with No. 4, and there is an enclosed timber gangway—5 ft. wide—to No. 2, with a fireproof door at each end. The gangway is in the centre of the end wall of No. 3, and extends straight across yard to No. 2a.

No. 4. There is a non-fireproof cartway—15 ft. wide—through the centre of this building.

No. 5. The side of this building facing the yard is open, the roof being supported on iron pillars.

No. 6. Four floors. The part marked (*a*) is an enclosed staircase of brick or stone carried to the level of the top floor only. The part (*b*) is a timber-built hoist 6 ft. square through the floors. The party wall to No. 7 is of brick or stone, and is absent on one floor.

No. 7. Four floors. The parts (*a*) and (*b*) (non-fireproof) are separated on the ground floor only by a brick or stone party wall There is a timber-built staircase 15 ft. by 5 ft. through all floors of the part (*b*) adjoining the outer wall of the building next to the field.

No. 8. The division wall between this building and No. 7 is carried up to, but not through, the roof. There are windows in the upper floors of this building overlooking the roof of No. 9.

No. 9. This building contains two horizontal steam boilers, each 30 feet long and 8 feet in diameter, the remaining space in the width of the building being equalised. The dotted line indicates the firing end of the boilers. The main chimney, 8 feet square, is built in the corner marked *x*.

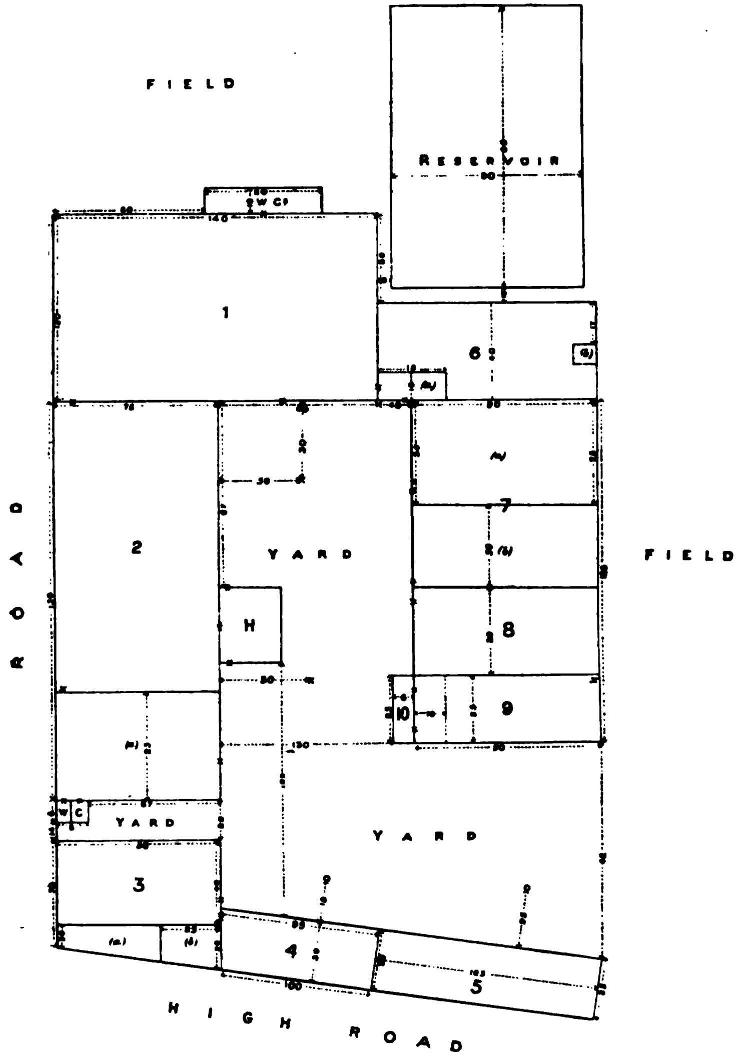
No. 10. Is timber-built.

Yard. The letter **X** denotes the position of two hydrants connected to a steam pump on the premises. The letter **O** denotes the position of two hydrants connected to the Town's main.

TREDEGAR MILLS, LOWTOWN, GLOUCESTER.

Owners and Sole Occupiers:

WM. SMITH & SONS, Woollen Manufacturers.



LIFE BRANCH.

PART I., SECTION A.—MATHEMATICS.

(*Three hours allowed for this Paper.*)

Questions.

1. Multiply 29·37689 by ·0392 by the method of *contracted* multiplication, obtaining four places of decimals in the product.

Divide 224·1522 by 1·963768 by the method of *contracted* division, finding the quotient to four decimal places.

2. State and verify the rule for reducing a mixed circulating decimal to a vulgar fraction.

Express $\cdot 00\dot{5}1\dot{3} + \cdot 0\dot{6} + \cdot 043 + \cdot 0375$ as a mixed circulating decimal.

3. How much is the difference between $£\left(\dfrac{2\frac{1}{2}+3\frac{1}{4}\div\frac{4}{5}\text{ of }\frac{13}{20}}{(2\frac{1}{3}+1\frac{3}{4})\times 2\frac{4}{7}-5\frac{1}{4}}\right)$ and £1?

4. A watch is 5 minutes slow at 12 noon on Monday, and $3\frac{1}{2}$ minutes fast at 3 p.m. on Wednesday following. When was it exactly right?

5. A person invested equal sums of money in $2\frac{1}{4}$ per cent. stock at 85, $2\frac{3}{4}$ per cents. at 95, and $3\frac{1}{4}$ per cents. at 105; when the price of each stock had risen £5, he sold out of the first and last and invested the proceeds in the other, and thus increased his income by £1. Find the whole sum invested, supposing the prices quoted to be inclusive of brokerage.

6. Explain the uses of logarithms.

Given $\log 3 = \cdot 4771213$ find the logarithm of $\dfrac{(1+\frac{143}{100})^{\frac{3}{5}}\times(\cdot 81)^{\frac{1}{4}}}{(2+\frac{529}{100})^{\frac{1}{3}}\times(3\frac{1}{3})^{\frac{1}{2}}}$

7. A policy for £1000 has been in force for forty years, during which time a quinquennial bonus at the rate of 26s. per cent. per annum compound has been added. Find the total amount of policy with bonuses, given

$$\log 2 = \cdot 30103 \quad \log 3 = \cdot 47712$$
$$\log 71 = 1\cdot 85126 \quad \log 1\cdot 65 = \cdot 2188$$

8. Show that a quadratic equation cannot have more than two roots.

If the product of the roots of the equation $ax^2 + bx + c = 0$, is equal to one-third of the sum of their squares, prove that $b^2 = 5ac$.

9. Solve the equations: (i.) $(x-3)^2 + 3x - 22 = \sqrt{x^2 - 3x + 7}$

(ii.) $\left.\begin{aligned} x^2 + xy + y^2 &= 13 \\ x^4 + x^2y^2 + y^4 &= 91 \end{aligned}\right\}$

10. A person bought a certain number of oxen for £240, and after losing three sold the remainder for £8 a head more than they cost him, thus gaining £59 by the bargain. What number did he buy?

11. A wine merchant sold seven dozen of sherry and twelve dozen of claret for £50. He sold three dozen more of sherry for £10 than he did of claret for £6. Find the price of each kind of wine.

12. Deduce formulæ for the sum of n terms in:—(i.) Arithmetical progression; (ii.) Geometrical progression.

If A, G, H, be the arithmetic, geometric, and harmonic means between a and b, show that G is the geometric means between A and H.

13. If S_n denote the sum of n terms of a GP whose first term is a and common ratio r, find the sum of

$$S_1, \ S_3, \ S_5 \quad \ldots \quad \ldots \quad S_{2n-1}$$

LIFE BRANCH.

PART I., SECTION B.

(*Three hours allowed for this Paper.*)

QUESTIONS.

1. Make up Agent's account showing balance due by him to the Office, assuming he is entitled to commission at the rate of £1°/ₒ on the sums assured for the first year at 2½°/ₒ on renewal premiums:

His total debit for renewal premiums is ..	£25	0	0
Of these premiums there have been paid to him	22	15	0
Policy 26879, J. Smith, has not been renewed	2	5	0

The following new policies have been obtained, the first premiums on which he has been debited with, and also received:—

Policy 27350, J. Brown. Sum assured, £300. Yearly premiums, £9 10s. 0d. Policy 27373, J. Jones. Sum assured, £200. Half-yearly premiums, £2 7s. 6d.

A policy value loan as undernoted has been paid by him on behalf of the Office:

Policy 23460, R. Martin. Loan ..	£10	0	0
Less Bond Stamp	0	0	3
	£9	19	9

2. Give a note of the usual items, assuming your own figures, in the Revenue Account of an Office doing Life and Annuity business, and indicate which of such items would be affected by the undernoted transactions, and in what way:—

(1) Bonuses of £20 surrendered for a cash payment of £9 10s. 0d.

(2) Bonuses of £18 surrendered, and their cash value of £8 applied in payment of renewal premium of that amount.

(3) £10 interest received, less tax 12s. 6d., net £9 7s. 6d.

3. State generally the special functions of the Cash Book, Journal, and Ledger in book-keeping.

4. State whether you think it advisable that Reports should be taken by an Office in the following cases, and give reasons indicating also how special circumstances might to some extent affect matters:—

(1) Ordinary medical report from proposer's own family doctor, assuming he is a thoroughly qualified man.

(2) Friends' reports (*a*) where they have known proposer for only three or four years; (*b*) where they have known him for a lengthened period, but for several years have seen little of him; (*c*) where are nearly related to him; (*d*) where they have an interest in the insurance.

5. Give a note of the principal questions usually given in the proposal form. State for what points you would look specially in (*a*) the friends' reports and (*b*) the agent's report.

6. Indicate particulars of *say three* assumed cases in which you would think it advisable to get a Report from proposer's own medical adviser (supplementary to the examining doctor's Report).

7. Can one person insure the life of another? If so, does this apply universally, or only in special circumstances, and if the latter, state these.

8. State as fully as you can the cases in which an Office usually requires an extra premium, apart from the question of health, habits, etc., detailing special occupations, etc. In what circumstances would you advise that a policy without liability for extra should *not* be granted, even though no extra premium was to be charged initially, and it was the practice of the Office to grant such policies in ordinary cases?

9. Give a rough draft of an ordinary Whole Life Policy with profits, assuming whatever names, designations, sum assured, premium, etc., you wish. State when a Company's liability under a new policy commences.

ACCIDENTAL BRANCH.

PART I., SUBJECT—CORRESPONDENCE.

(*One hour and a half allowed for this Paper.*)

Questions.

1. Having received letter from a gentleman stating that he has been insured with another Company, and, being dissatisfied with that Company's treatment of his recent personal accident claim, has been recommended to apply to you with a view of effecting a P.A. insurance; write letter in reply. Indicate also what steps you would take.

2. Your Company having found it necessary to increase on renewal the rate for a W.C.A. risk, and your agent having written that another Company has offered to take the business at the rate at which you had the insurance and asking you to reduce, the days of grace having expired, write letter to the agent.

3. It being a rule of your Company that an agent must not have his renewal papers if an account previously rendered remains unpaid after a certain fixed period has elapsed, write to an agent of influence whose account is so overdue and whose renewals are due.

4. Write a letter to a P.A. policy holder (direct case, no agent) who, on receipt of renewal notice, has written you that he thinks he will not renew his policy, as in his opinion he runs no risk of accident.

5. An agent, in settling his account, sends his client's cheque in part payment, which is returned dishonoured. Write suitable letter to the agent.

6. A policy holder having met with a severe injury to his knee years ago, and his policy having been endorsed barring this particular knee, writes he will require the endorsement deleted, as another Company has offered to give him a clean policy. Write instructing your agent how to act.

ACCIDENTAL BRANCH.

PART I., SUBJECT—BOOK-KEEPING.

(*Two-and-a-quarter hours allowed for this Paper.*)

QUESTIONS.

1. Draft Policy and Renewal register for Employers' Liability Act.

2. Draft Policy and Renewal register for Workmen's Compensation Act.

3. Give ruling of Third Party register.

4. An estate owner holds a W.C.A. policy now due for renewal as under:—

(1)	Quarrying risk	£2000 at 15/- °/ₒ
(2)	Brickmaking	£3500 at 10/6 °/ₒ
(3)	Building and estate repairs ..	£4500 at 10/- °/ₒ
(4)	Gas works	£400 at 7/6 °/ₒ
(5)	Agricultural and estate work ..	£750 at 3/6 °/ₒ
(6)	Office and clerical staff	£600 at 5/- °/ₒ

is desirous of continuing his insurance for the same amounts at the same rates with the exception of the 1st and 5th items, the rates for which are increased to 20/- °/ₒ and 8/- °/ₒ respectively. He returns wages for past 12 months as under:

Quarrying, £1828; Brickmaking, £3673; Building and estate repairs, £4702; Gas works, £369; Agricultural and estate work, £780; Office and clerical work, £610.

Make out statement showing the premium payable.

5. The following items appear in an agent's debit:—

P.A. policy 28407, Prem. (new) £4 10s. 0d.
" " 16113/4, Prem. renewal £3, and £3 less bonus 6/-
W.C.A. policy 19224/5, Prem. £16 17s. 6d. and £4 15s. 0d.
" " 8929/30, Prem. £10 5s. 0d. (renewal) and £8 (renewal). Rebate, 11/6; Excess, £1 12s. 3d.

Burg. policy 2674/5/6, Prem. renewals 17/6, 18/9, and 10/.
Fid. G'tee policy 3424, Prem. £2 10s. 0d. (new).
" " 976, Prem. £4 0s. 0d. (renewal).
T.P. policy 1734, Prem. £18 0s. 0d. (renewal).
The commissions are as follows:—P.A., 15°/₀ new, 10°/₀ renewal; W.C.A., 10°/₀ new and renewal; Burg., 15°/₀ new and renewal; Guarantee, 10°/₀ new, 7½°/₀ renewal; Third Party, 10°/₀ new and renewal.
Render statement, allowing 3/6 postage.

N.B.—Special attention must be given to the form in which this account is worked out.

ACCIDENTAL BRANCH.

PART I., SUBJECT—CLASSIFICATION OF RISKS (PERSONAL ACCIDENT).

(*Three-quarters of an hour allowed for this Paper.*)

QUESTIONS.

1. Give six trades or professions in each of the three classes: (*a*) Ordinary; (*b*) Medium; (*c*) Hazardous.

2. Indicate the correct classification:

(1) Civil engineer.
(2) Warehouseman.
(3) Livery stable proprietor.
(4) Quarry owner.
(5) Farmer.
(6) Sanitary inspector.

3. Name not less than six occupations not insurable under P.A. policies.

ACCIDENTAL BRANCH.

PART I., SUBJECT—KNOWLEDGE OF EMPLOYERS' LIABILITY ACTS, 1880, 1897, 1900.

(*One hour and a half allowed for this Paper.*)

QUESTIONS.

1. Give employments to which the W.C.A. 1897 does *not* apply.
2. What important distinction is to be noticed between the Acts of 1897 and 1900, in regard to their application to the employments specified therein?
3. What compensation is payable under W.C.A. for
   (*a*) Fatal accidents with dependents (total).
   (*b*) Fatal accidents with dependents (partial).
   (*c*) Permanent partial disablement where difference in earning capacity is agreed 12/6 per week.
4. Who are dependents under the W.C.A.?
5. How would you measure the height of a building on which an accident has occurred to ascertain as to liability under the W.C.A.?
6. Give illustrations of accidents rendering the employer legally liable under (*a*) the 1880 Act, (*b*) the 1897 Act, and (*c*) the 1900 Act.
7. What are the provisions as to examination by the Government medical referee under the Workmen's Compensation Act?
8. What are the conditions precedent to the right to recover under the Employers' Liability Act, 1880?

ACCIDENTAL BRANCH.

PART II., SUBJECT—CLAIMS AND THEIR SETTLEMENTS.

(*Two hours allowed for this Paper.*)

PERSONAL ACCIDENT.

1. Explain the following as interpreted by Accident Companies under personal accident policies:

   (*a*) "Accident."
   (*b*) "Permanent total disablement."
   (*c*) "Permanent partial disablement."

2. Define the difference between temporary total and temporary partial disablement.

3. A policy-holder is reported to have fallen down a flight of stairs at home, and to have been killed on the spot. What steps would you take to investigate the claim ?

EMPLOYERS' LIABILITY ACT, 1880.

4. What are the requisites in regard to notice of accident, and within what time must an action be brought ?

5. What defences would you endeavour to establish against a claim under the Act in respect of—

(*a*) Defective plant ?
(*b*) Negligence of a foreman ?

6. Explain the principle of contributory negligence and its effect.

WORKMEN'S COMPENSATION ACT, 1897.

7. What compensation is payable to an injured workman in respect of partial incapacity, and how would you deal with a claim therefor ?

8. Under what circumstances and against whom is an "Undertaker" entitled to claim indemnity in respect of any compensation he may have been called upon to pay an injured workman ?

9. What is the position of an injured workman whose employer, being insured—

(*a*) Ceases to carry on business ?
(*b*) Becomes bankrupt ?
(*c*) Dies ?

ACCIDENTAL BRANCH.

PART II., SUBJECT—POLICY DRAFTING.

(*One hour allowed for this Paper.*)

ENDORSEMENTS.

1. Proposer for Personal Accident policy states he has previously injured cartilage of right knee, but in other respects is a good risk. Draft suitable endorsement.

2. Draft a suitable clause for a General Indemnity policy by which the policy-holder is to subrogate to the Insurance Company any rights he may have against Third Parties.

3. Draw an endorsement to be placed on an Employer's Insurance policy excluding any claim exceeding £100.

ACCIDENTAL BRANCH.

PART II., SUBJECT—INDEMNITY (THIRD PARTY).

(*Two hours and a half allowed for this Paper.*)

CORRESPONDENCE.

1. A livery stable proprietor requires general information and probable cost in connection with his Third Party risk. Write suitable reply.

2. A firm of builders write your Company asking you to explain to them what accidents can occur in their work that they could be held liable for to Third Parties. Reply fully.

CLAIMS.

3. Your insured's waggonette containing passengers is run into at night by a carrier's cart; two passengers in the waggonette are injured and make claims against your policy-holder; how would you proceed to investigate the whole matter?

SETTLEMENTS.

4. A and B's vehicles come into collision and are both damaged. After inquiry it is indisputably proved that both drivers were at fault. A is insured in your company, B in another company. How would you proceed?

LEGAL ASPECTS.

5. A person passing along a public thoroughfare is bitten by a horse. Has the person any claim against the owner?

6. What claim has a parent whose child (aged two years) has been run over and killed by the carelessness of a car driver?

ACCIDENTAL BRANCH.

PART II., SUBJECT—MEDICAL AND SURGICAL TERMS.

(*One hour allowed for this Paper.*)

1. Define in non-technical language:

Perityphlitis,
Tetany,
Appendicitis,
Caries,
Fracture:—(*a*) Simple,
(*b*) Compound,
(*c*) Comminuted,
(*d*) Compound comminuted.

2. In what part of the body are the following:
   Fibula,
   Humerus,
   Pelvis,
   Tibia,
   Coccyx?
3. What is:
   Gastritis,
   Erysipelas,
   Varicose Veins,
   Strangulated Hernia?
4. Describe in your own language:
   Synovitis,
   Granulation,
   Sinus.

NAMES OF SUCCESSFUL CANDIDATES—1903.

The following is the Official List of Successful Candidates at the Examinations, held simultaneously at the various Insurance centres, April 22nd to 29th, 1903. The letter "P" opposite a name signifies Pass, "H" Honours, and "C" Certificate.

FIRE BRANCH.

	Part I.								Part II.								
	Policy Drafting.								Tariffs.			Processes of Manufacture.					
	Tanneries.	Woollen Mills.	Re-insurances.	General Rules.	Bookkeeping.	Chemistry.	Electricity.	Passed in Part I.	Woollen Mills.	Corn Mills.	Tanneries.	Leather.	Flour.	Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.
Aberdeen.																	
Thomson, J., *North British and Mercantile*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Birmingham.																	
Drinkwater, J., *Northern*	...	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Plummer, N. C., *Northern*	...	...	...	P	...	...	C	...	...	...	...	...	...	...	...	...	...

Sparshott, H. L., *Scottish Union and National* ...	P	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Turner, H. E., *Scottish Union and National*	...	...	...	...	...	...	...	...	...	H	...	...	...	...	...	...	...
Wheeldon, O., *Caledonian*	P	P	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Woodward, J. H., *Scottish Union and National* ...	P	...	P	P	...	C	...	...	...	...	...	...	...	...	...	...	...
Bristol.																	
Harris, H. E. B., *Atlas*	...	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Kepple, R. H. J., *Norwich Union*	...	...	...	...	...	...	...	...	...	H	H	H	P	...	P	...	...
Dublin.																	
Cruise, W. R., *Patriotic*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
McNab, W. R., *Guardian*	...	...	...	H	...	...	...	...	...	...	H	...	...	...	H	...	...
Dundee.																	
Lamont, J. J., *London and Lancashire*	...	...	...	...	...	...	...	...	...	H	H	H	...	...	P	P	...
Edinburgh.																	
Anderson, J. M., *Scottish Union and National*	P	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Cownie, D., *Scottish Alliance*	P	P	H	H	...	...	C	...	...	...	...	...	...	...	...	...	...
Douglas, C. C., *Scottish Alliance*	...	P	P	P	C	...	...	...	...	...	...	...	...	...	...	...	...
Fyfe, H. M., *North British and Mercantile*	P	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1903—*continued.*

	PART I.								PART II.								
	Policy Drafting.								Tariffs.			Processes of Manufacture.					
	Tanneries.	Woollen Mills.	Re-insurances.	General Rules.	Bookkeeping.	Chemistry.	Electricity.	Passed in Part I.	Woollen Mills.	Corn Mills.	Tanneries.	Leather.	Flour.	Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.
EDINBURGH—*continued.*																	
Maclean, P. K., *Scottish Union and National*	...	P	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Maclennan, D. A., *Scottish Union and National* ...	H	P	P	H	...	...	...	...	...	...	...	...	..	...	...	...	...
Mill, J., *Scottish Union and National*	...	H	H	H	...	...	...	...	...	...	...	...	...	...	...	..	...
Murray, W., *Scottish Union and National*	H	...	P	..	...	...	...	...	..	..	...	..	...	...	...	...	...
GLASGOW.																	
Heughan, R. M. K., *West of Scotland*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	..	...	...
Hodge, J. W., *West of Scotland*	...	...	P	P	...	...	...	...	...	...	...	...	...	...	..	...	...
Lillie, D. S. A., *West of Scotland*...	...	...	...	P	..	...	...	..	...	...	..	...	...	...	...	...	...
Macfarlane, J. M., *North British and Mercantile* ...	...	...	H	H	...	...	...	...	...	...	...	...	...	.	...	...	...
McRobert, J. H., *Guardian*	H	H	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...

Leeds.																	
Bastow, J. A., *Atlas*	...	...	...	P	C	C	...	...	...	H	...	...	P	...	...	...	...
Bennett, J. E., *Law Union and Crown*	...	...	H	P	C	C	...	...	...	...	...	...	...	...	...	...	...
Crosland, G. H., *British Law*	P	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Ellis, J. M., *North British and Mercantile*	...	P	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Goddard, A. W., *Royal*	P	P	P	P	...	C	C	...	...	...	...	...	...	...	...	...	...
Leach, B., *Liverpool and London and Globe*	...	P	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Leishman, J., *North British and Mercantile*	H	H	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Littlewood, J. H., *British Law*	...	P	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Mallett, F. C., *Atlas*	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Metcalfe, P. W., *Atlas*	...	...	P	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Needham, E. J., *British Law*	...	...	...	...	...		...	...	...	...	H	...	...	...	P	P	...
Read, R., *Westminster*	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	P	...
Vaughan, C. G., *British Law*	...	...	H	P	...	...	...	...	...	..	...	...	...	...	...	...	...
Wood, E. S., *Atlas*	P	P	...	...	...	...	...	...	...	...	H	P	...	...	...	...	...
York.																	
Monkman, P. L., *Yorkshire*	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wood, H. H., *Yorkshire*	...	...	P	...	...	...	...	...	H	H	H	...	...	...	...	P	...

NAMES OF SUCCESSFUL CANDIDATES, 1903—*continued.*

	Part I.								Part II.								
	Policy Drafting.								Tariffs.			Processes of Manufacture.					
	Tanneries.	Woollen Mills.	Re-insurances.	General Rules.	Bookkeeping.	Chemistry.	Electricity.	Passed in Part I.	Woollen Mills.	Corn Mills.	Tanneries.	Leather.	Flour.	Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.
London.																	
Clayton, A. E., *Law Union and Crown*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...
Davies, W. J., *Royal*	...	...	...	...	...	...	...	...	...	H	H	...	...	...	...	...	...
Dubock, H. B., *Northern*	...	...	...	H	C	C	C	...	...	...	...	...	...	...	...	...	...
Healy, L. T., *Royal*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...
Henderson, J., *Hand-in-Hand*	...	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Manton, E. G., *Law Union and Crown*	...	...	...	...	...	...	...	...	...	H	H	...	H	C	...	P	..
Walker, W. H., *Union*	...	...	...	...	...	...	...	...	H	H	H	H	H	...	P	P	...
Manchester.																	
Arnold, V., *Scottish Union and National*	...	P	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Barton, A. G., *London and Lancashire*	...	H	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...

MANCHESTER—*continued.*

Brown, H., *Manchester*	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Butler, J., *Manchester*	P	P	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Catling, F. J., *Manchester*...	...	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Chambers, L., *Guardian*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Colgon, A. H., *Manchester*	...	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Cooper, A. E., *Royal*	P	H	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Cordingley, A., *London and Lancashire*	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gray, W., *Co-operative*	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Grimshaw, W., *Co-operative*	H	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hall, C. A., *Scottish Union and National*	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hirst, P. B., *National of Ireland*	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Horsfall, B. E., *Atlas*	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jackson, E. S., *Manchester*	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mallett, S., *Northern*	P	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mason, J. H., *Northern*	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mills, W. H., *Commercial Union*...	P	P	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Norris, N. A., *Manchester*	P	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1903—*continued.*

	Part I.								Part II.								
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	Tanneries.	Woollen Mills.	Re-insurance.	General Rules.	Bookkeeping.	Chemistry.	Electricity.	Passed in Part I.	Woollen Mills.	Corn Mills.	Tanneries.	Leather.	Flour.	Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.
Manchester—*continued.*																	
Richards, G. P., *Atlas*	...	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Royds, A., *Manchester*	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Schofield, J. W. K., *Law Union and Crown*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...	...
Smith, H., *Commercial Union*	P	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Smith, S. A. G., *Alliance*	P	H	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Trafford, J. L., *Manchester*	P	..	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Newcastle.																	
Allen, D. C., *North British and Mercantile*	...	P	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Armstrong, R. P., *Royal Exchange*	...	...	...	...	...	...	...	...	...	P	H	...	...	...	...	...	...
Bell, J. E., *North British and Mercantile*	...	P	P	H	...	..	C	...	...	...	...	...	...	...	...	...	...

Newcastle—*continued.*																	
Brown, H. A., *Liverpool and London and Globe*	...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Chapman, E. H., *London and Lancashire*	...	...	H	...	...	C	C	...	...	...	...	...	..	...	...	..	...
Courage, J. R., *British Law*	..	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Gardner, R. O., *Royal*	...	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Hansen, G. E., *Norwich Union*	...	...	...	...	C	...	C	...	...	...	H	H	...	...	H	P	...
Hicks, J. E., *North British and Mercantile*	...	P	H	H	...	..	...	...	...	...	...	...	...	...	...	...	...
Hopper, W. J., *Royal*	...	...	...	...	...	...	...	...	...	...	H	...	...	...	...	...	...
Hughes, B., *Union*	...	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
Judge, J. J., *Norwich Union*	...	P	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...
Macmillan, J. A., *Northern*	...	...	...	...	...	...	...	...	H	H	H	H	H	...	H	P	...
Marshall, S., *Norwich Union*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Merson, J. L., *London and Lancashire*	P	P	H	H	...	C	C	...	...	...	...	...	...	...	...	...	...
Nicholson, E. D., *Alliance*	...	P	H	H	C	...	...	...	...	...	...	...	...	...	...	...	...
Scott, C., *Commercial Union*	P	H	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Sopwith, S., *North British and Mercantile*	...	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...
Walker, A., *Northern*	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...
White, C., *British Law*	P	...	H	P	C	...	...	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1903—*continued.*

	PART I.									PART II.									
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	Tanneries.	Woollen Mills.	Re-insurance.	General Rules.	Bookkeeping.	Chemistry.	Electricity.	Passed in Part I.	Woollen Mills.	Corn Mills.	Tanneries.	Leather.	Flour.	Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.
NORWICH.																	
Baxter, S., *Norwich Union*	...	...	H	H	C	...	...	...	...	...	...	...	...	...	...	...	...
NOTTINGHAM.																	
Mallett, R. W., *Northern*	...	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...
PERTH.																	
Brown, R., Jun., *General Accident*	...	...	...	...	...	...	...	...	...	. .	...	...	...	...	P	...	...
Campbell, K., *General Accident*	...	H	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...

LIFE BRANCH.

	Part I.	
	A.	B.
Birmingham.		
Woodward, J. H., *Scottish Union and National* ...	P	P
Toronto.		
Glazier, S. J. N., *Manufacturers' Life*	...	P
Macorquodale, F. D., *Manufacturers' Life*	P	H
Winfield, F. E., *Manufacturers' Life*	...	P

NAMES OF SUCCESSFUL CANDIDATES, 1903—*continued.*

ACCIDENT BRANCH.

	PART I.					PART II.					
	Correspondence.	Book-Keeping	Classification.	Knowledge of Employers' Liability	Passed in Part I.	Claims.	Policy Drafting	Indemnity Insurance.	Medical and Surgical Terms.	Passed in Part II.
BRISTOL.										
Iles, J. J., *Royal Exchange*	...	...	...	P	...	...	...	...	...	...
LEEDS.										
Coltman, A., *Employers' Liability* ...	P	...	...	...	1903	P	...	P	H (Special mention)	...
Evered, P., *Ocean*	...	H	H	P	...	...	..	...	...	...
Hagyard, C., *Ocean*...	...	P	...	...	...	...	...	...	...	...
Jackson, F. T., *Rock Life*	P	...	H	...	...	...	...	...	...	...
Jolliffe, E. H., *London and Lancashire* ...	P	P	H	...	...	...	...	...	...	...
Plant, J. E., *Ocean*	H	...	H	H	...	...	...	...	...	...
Thackrah, R., *Ocean*	...	...	H	...	..	...	...	...	...	...

NEWCASTLE.										
Scott, G. E., *Ocean*	P	...	...	H	...	...	...	...	...	...
NOTTINGHAM.										
Hill, F. N., *Norwich and London* ...	..	...	...	...	...	..	P	...	...	1903

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1. Officers of the Federation.
2. The Federated Institutes.
3. Conference, 1899, Leeds.
4. Report of Executive, 1898-1899.
5. Address of President (Mr. J. B. Tennant, Bradford).
6. Examiners, 1899-1900.
7. Bleach Works. By J. W. Webster, *Insurance Association of Manchester.* 1899.
8. Boot and Shoe Factories. By John P. Green, *Norwich Insurance Institute.* 1899.
9. Breweries and Distilleries. By W. S. Kinnear, B.A., *Insurance Institute of Ireland.* 1899.
10. Collieries. By John G. Boss, *Insurance Institute of Newcastle-on-Tyne.* 1898.
11. Cotton Spinning Mills. By T. A. Bentley, *Insurance Institute of Manchester.* 1899.
12. Drafting Fire Insurance Contracts. By C. E. Noverre, *Birmingham Insurance Institute.* 1899.
13. Heredity. By Wm. Thorburn, F.R.C.S., *Insurance Institute of Manchester.* 1899.
14. Old Age Pensions. By F. Schooling, F.I.A., *Insurance Institute of Bristol.* 1898.
15. Old Age Pensions. By George King, F.I.A., F.F.A., *Insurance and Actuarial Society of Glasgow.* 1899.
16. On the Manner in which the Effect of Muscular Exercise upon the Heart and Blood Vessels alters the Expectation of Life. By T. Sydney Smart, M.D., M.R.C.P., D.P.H., *Birmingham Insurance Institute.* 1899.
17. Salvage Corps: The Benefits to be Derived by Fire Insurance Companies from the Establishment of. By William Postdown, *Insurance and Actuarial Society of Glasgow.* 1899.
18. Scope and Work of the Insurance Institutes. By Charles Povah, *Birmingham Insurance Institute.* 1898.
19. On the Selection of Lives for Assurance. By W. Hughes, F.I.A., *Insurance Institute of Newcastle-on-Tyne.* 1898.
20. Tanning and Currying. By George Chappell, *Insurance Institute of Yorkshire.* 1899.
21. Tariff Legislation. By F. J. Kingsley, *Insurance and Actuarial Society of Glasgow.* 1899.
22. Examination Papers and Instructions to Competitors. 1899.

The following appeared in Vol. III., published in 1900:-

1. Officers of the Federation.
2. The Federated Institutes.
3. Conference, 1900, Bristol.
4. Report by Executive, 1899-1900.
5. Address of President (Mr. S. G. Moxey, Bristol).
6. Examiners, 1900-1901.
7. Insurance Clerks' Orphanage Report.
8. Characteristics of the Tables of Mortality. By W. H. Aldcroft, F.I.A., *Insurance Institute of Manchester.* 1900.
9. Corn Mills. By James Wardle, *Insurance Institute of Yorkshire.* 1892.
10. Cost Price of Fire Insurance. By James Ostler, *Insurance Institute of Bristol.* 1898.
11. Cotton Factories and Sheds. By J. H. Bagshaw, *Insurance Institute of Manchester.* 1900.
12. Employers' Liability and the Workmen's Compensation Act, 1897. By C. H. Green, *Insurance Institute of Yorkshire.* 1900.
13. Extra Premiums for Life Assurance. By J. Moody Stuart, F.I.A., F.F.A., *Insurance Institute of Yorkshire.* 1900.
14. Farms and Farming Stock. By C. R. Quinton, *Norwich Insurance Institute.* 1900.
15. Felt Hat Works. By J. H. Chapman, *Insurance Association of Manchester.* 1899.
16. Fire Hazard of the More Important Chemical Products. By Dr. E. H. Cook, M.A., F.I.C., F.C.S., *Insurance Institute of Bristol.* 1900.
17. Fire Insurance. By John M. M'Candlish, F.R.S.E., F.F.A., *Insurance and Actuarial Society of Glasgow.* 1900.
18. Life Agency Work. By W. M. Potterton, *Insurance Institute of Ireland.* 1900.
19. Metal Working Risks. By J. Headon Boocock, *Birmingham Insurance Institute.* 1899.
20. Observations on the Progress and Prospects of Fire Insurance as a Science. By David L. Laidlaw, *Insurance and Actuarial Society of Glasgow.* 1899.
21. Phthisis in Relation to Life Assurance. By W. B. Ransom, M.D., F.R.C.P., *Nottingham Insurance Institute.* 1900.
22. Roller Milling. By A. B. Dansken, *Insurance and Actuarial Society of Glasgow.* 1892.
23. Rope Works. By Owen D. Jones, *Insurance Institute of Newcastle-on Tyne.* 1900.
24. Shipbuilding Yards and Marine Engineering Works. By Arthur H. Knight, *Insurance and Actuarial Society of Glasgow.* 1900.
25. Examination Papers and Names of Successful Candidates, 1900.

The following appeared in Vol. IV., published in 1901 :—

1. Officers of the Federation.
2. Examiners, 1901-1902.
3. List of Subscribing Offices.
4. Treasurer's Statement, 1900.
5. The Federated Institutes.
6. Institutes Affiliated with the Federation.
7. Conference, 1901, Glasgow.
8. Report of Executive, 1900-1901.
9. Address of President (Mr. David L. Laidlaw, Glasgow).
10. Address by Mr. N. B. Gunn, F.F.A., F.I.A., Glasgow.
11. Insurance Clerks' Orphanage Report.
12. Aims and Rewards of an Insurance Career. By John Rodger, *Nottingham Insurance Institute.* 1900.
13. Coal-Tar Distilling and Chemical Manure Manufacturing. By C. E. Trufitt, *Norwich Insurance Institute.* 1896.
14. Cotton Spinning Mills (Second Part). By Thomas A. Bentley, *Insurance Institute of Manchester.* 1899.
15. Cycle Factories. By A. E. Patrick, *Birmingham Insurance Institute.* 1900.
16. Daily Questions of Legal Title, with Appendix—Notes on Stamp Duties. By Warren Crosbie, B.L., *Insurance and Actuarial Society of Glasgow.* 1901.
17. Gasworks. By J. Haworth Chapman, *Insurance Institute of Newcastle-on-Tyne.* 1901.
18. Glycosuria and Life Assurance. By Dr. J. Stitt Thomson, *Nottingham Insurance Institute.* 1900.
19. Heating and Ventilation. By William Sutcliffe, *Insurance Association of Manchester.* 1901.
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21. Life Assurance Prospects at the Opening of the Twentieth Century. By H. W. Andras, F.I.A., *Insurance Institute of Newcastle-on-Tyne.* 1901.
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27. Workmen's Compensation. By C. H. Franklin, *Insurance Institute of Ireland.* 1900.
28. Worsted Mills. By J. Cooper Eddison, *Insurance Institute of Yorkshire.* 1896.
29. Examination Papers and Names of Successful Candidates, 1901.

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